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VOCATIONAL GUIDANCE OF EXECUTIVES[1]

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"Men engaged in a particular profession or occupation have a characteristic set of likes and dislikes that distinguish them from men in other professions." This generalization is fairly well supported by a study of sixteen different occupations. But data from eighty executives indicate that this may not be true for this occupational group, as such.

Although executives probably do not have the interests of engineers, personnel managers, bankers, lawyers, ministers, artists, etc., to any greater degree than is true of any other occupational group yet members of many occupational groups rate as executives to a surprising degree. Either there are many more men of executive caliber than is recognized today or else the scale for executive interest described below is faulty.

This article is published as a "progress report" in an extensive study of the interests of men in various occupations. It records certain results concerning the interests of executives. And it calls attention to certain difficulties that must be overcome before executives as a group may be adequately investigated.

THE VOCATIONAL INTEREST TEST

The data secured in this study have been secured through the use of an interest analysis blank which contains 263 items, such as actor, architect, army officer, artist, astronomer, . . . quick-tempered people, optimists, pessimists, people who forgive very quickly, grudge-holders, ... golf, fishing, professional baseball, tennis, swimming. The individual to be

[1] The writer is under obligation to Ambrose J. Martin for much of the statistical work involved in this research.

tested indicates after each item his attitude toward it—whether of like, indifference or dislike.[2]

From the records of eighty executives it is known that such men have total scores ranging between 16 and 195. We assume that an individual being tested has the likes and dislikes characteristic of executives if his total score on the executive scale is above 16 and that he does not have the likes and dislikes characteristic of executives if his total falls below 16.

A man is rated C if his score falls below that obtained by any executive (i.e., 16). He is rated A, on the other hand, if his score is within the range obtained by the 75 per cent of executives who score highest on the test (i.e., above 76). He is rated B if his score falls within the range of the fourth quarter of executives (i.e., between 16 and 76).

A rating of A means, accordingly, that the individual does have the interests of executives, a rating of C means he does not have, and a rating of B is intermediate. Our results show that many men rate B in one or more professions to which they

[2] From these data a method measuring a man's professional interest was developed as follows: First, the per cent of men in eighteen occupations who like, are indifferent to or dislike each of the 263 items was obtained. (Thus, 38 per cent like to be an actor, 35 per cent are indifferent, and 27 per cent dislike it.) Second, the per cent of members of any profession, as that of executive, who like, are indifferent to, or dislike each of these items was obtained. (Thus 27 per cent of executives like to be an actor, 32 per cent are indifferent, and 41 per cent dislike it.) Third, the differences for each item between men in general (using the data from the eighteen occupations for this purpose) and executives were obtained, i.e., −11 per cent, −3 per cent and +14 per cent in the case of the item "actor." Fourth, these differences were expressed by smaller figures (i.e., −2, −1, and +3), according to a statistical system outlined in the September 1926 article of the Journal of Personnel Research. These figures constitute the scoring system for measuring the extent to which anyone has the likes and dislikes characteristic of executives.

If a man records that he likes being an actor he receives a score of −2 toward being an executive; if he records that he dislikes being an actor he receives a score of +3 toward being an executive. The summary of 263 such scores gives his final score as compared with average executive interests.

do not belong. Consequently a rating of B in this test does not mean one clearly belongs to the profession in question, but it is true that many men who rate only B are successful in that occupation.

General observation of all our data shows that if a man rates A he has enough of whatever it is that is tested by the Interest Blank to make good in the given profession. His degree of success will depend upon other factors than those measured here. In the case of B ratings it appears that some men are not so successful as those who rate A, although some are just as successful. No thoroughgoing study has yet been made as to the relationship of success and score in the test.[3]

EXTENT TO WHICH EXECUTIVES HAVE INTERESTS CHARACTERISTIC OF OTHER OCCUPATIONS

Table 1 shows the extent to which men in certain occupations rate A or B in their own and other occupations. The first column gives data based on 80 executives. There it is shown that 75 per cent of executives rate A in executive interest and 25 per cent rate B; 20 per cent rate A in life insurance interest and 53 per cent B; 14 per cent rate A in office work and 38 per cent B; 14 per cent rate A in engineering interest and 30 per cent B. From these figures it appears that between 10 to 20 per cent of executives have interests that cannot be distinguished from those of life insurance salesmen, office workers, engineers, lawyers, or certified public accountants; that a few executives have the interests which clearly characterize personnel managers, bankers and ministers, but none are to be definitely identified as artists. In addition about one-third of

[3] Reports on personnel managers, certified public accountants and engineers have been made as follows: An Interest Test for Personnel Managers, Journal of Personnel Research, September, 1926; Interest Analysis of Personnel Managers, ibid.; October, 1926; Differentiation of Certified Public Accountants from Other Occupational Groups, Journal of Educational Psychology, April, 1927; and Vocational Guidance of Engineers, Industrial Psychology, June, 1927. See also, A Vocational Interest Test, Educational Record, April, 1927.

these executives rate B in the nine occupations considered here.

Some of these B ratings that executives receive in this test are due to the fact that the test does not properly differentiate one group from another. It is believed that the revised blank, which is now being standardized, will cut down these B ratings considerably and possibly change some A ratings to B. But there is no question but that many successful men in each

TABLE 1

Extent to which men in eight occupations have the interests of those in ten different occupations

OCCUPATIONAL INTEREST TESTS	80 executives		40 C.P.A.'s		EIGHT OCCUPATIONAL GROUPS						50 ministers		50 life insurance salesmen		56 artists	
					42 engineers		48 personnel managers		40 lawyers							
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
Executive	75	25	33	57	17	67	21	67	17	63	0	43	18	64	2	20
Life insurance salesmen	20	53	10	53	2	24	14	38	23	43	6	28	74	24	0	21
Office work	14	38	27	37	7	38	0	33								
Engineer	14	30	2	29	61	39	6	29	5	25	0	10	0	29	4	29
Lawyer	13	28	6	20	0	14	23	27	74	24	6	17	10	18	2	9
C.P.A.	10	35	74	25	2	19	6	17	5	23	0	0	4	12	0	0
Personnel manager	6	34	2	33	2	33	75	25	2	43	0	36	2	34	0	0
Banker	6	60	8	65	0	24	2	10								
Minister	3	19	0	10	2	5	0	27	8	10	76	24	4	8	0	14
Artist	0	9	0	4	2	5	0	2	0	5	0	12	0	0	71	29

occupation have such broad interests that they will rate A or B in a considerable number of occupations in addition to their own.

The ratings obtained by the entire eighty executives are given in table 2. The executives are grouped under eight headings according to what appears to be their major activity in business. The numbers in the middle column of table 2 refer to the individual executives, who are numbered in order of merit on the basis of their executive interest score. Numbers

TABLE 2

Occupational interest ratings obtained by eighty executives

The nine columns at the left record A ratings, the nine columns at the right record B ratings in the nine occupations. The numbers refer to the 80 executives.

A RATING									80 EXECUTIVES	B RATING								
Life Insurance Selling	Office work	Engineer	Lawyer	Accountant	Banker	Personnel Manager	Minister	Artist		Life Insurance Selling	Office Work	Engineer	Lawyer	Accountant	Banker	Personnel Manager	Minister	Artist
Manufacturing group																		
I									1			E		A	B			
									3	I		E		A	B			
		E							4	I				A	B			
I									7		O	E			B			
									9		O	E	L		B			
									15	I	O	E		A	B			
			L						25	I	O			A	B	P		
		E							32					A				
		E							33						B			R
	O								36						B	P	M	
									46			E		A	B			
	O								52			E		A	B		M	
I									53		O				B			
		E							54									R
I									58				L			P		
			L						61					A	B		M	
									62	I		E	L			P		
			L						64	I					B	P		
									65		O			A	B	P	M	
I									69				L		B	P		
									72			E			B	P	M	
I									73		O		L		B	P		
									75	I	O							
		E							76									
25*	8	21	13	0	0	0	0	0		29	33	38	21	42	75	38	21	8

* Figures indicate percentages.

TABLE 2—*Continued*

A RATINGS									80 EXECUTIVES	B RATINGS								
Life Insurance Selling	Office work	Engineer	Lawyer	Accountant	Banker	Personnel Manager	Minister	Artist		Life Insurance Selling	Office work	Engineer	Lawyer	Accountant	Banker	Personnel Manager	Minister	Artist
Merchandising group																		
			L	A					5	I	O				B			
I	O								10			E	L	A	B			
				A					18	I		E	L		B	P		
I									23			E	L					
I									24			E				P		
I									37		O	E						
I									40						B	P	M	
I									56		O							
I									70		O				B			
									77			E					M	
							M		78				L					R
I									80						B			
67*	8	0	8	17	0	0	8	0		17	33	50	33	8	50	25	17	8
Insurance group																		
I									11			E		A	B			
							M		43	I					B	P		
I									45				L		B	P		
I						P			48				L		B		M	
			L						59	I								R
60*	0	0	20	0	0	20	20	0		40	0	20	40	20	80	40	20	20
Banking group																		
				A					2	I	O		L		B	P		
									8	I	O		L			P		
				A	B				20	I								
									22	I	O	E	L	A	B			
									26	I		E	L	A	B			
									29				L	A		P		R
			L						35		O			A	B			
									38		O		L		B			
									42	I					B		M	
			L						66	I						P		R
	O				B				68								M	R
0*	9	0	18	18	18	0	0	0		64	45	18	55	36	55	36	18	27

TABLE 2—*Continued*

A RATINGS									80 EXECUTIVES	B RATINGS								
Life Insurance Selling	Office work	Engineer	Lawyer	Accountant	Banker	Personnel Manager	Minister	Artist		Life Insurance Selling	Office work	Engineer	Lawyer	Accountant	Banker	Personnel Manager	Minister	Artist
Finance (other than banking) group																		
				A					16		O	E	L		B	P		
I			L			P			28		O							
				A					34		O		L		B	P		
		O		A					41			E			B			
									63					A	B		M	
20*	20	0	20	60	0	0	0	0		0	60	40	40	20	80	40	20	0
Public utility group																		
I	O			A	B				21									
									27	I	O	E	L	A	B			
I	O				B				30					A				
									39		O	E				P		
I	O				B				44			E		A				
I									51		O	E				P		
	O								67					A	B			
57*	57	0	0	14	43	0	0	0		14	43	57	14	57	29	29	14	0
Engineering group																		
	O	E							12					A	B			
			L			P			19	I		E						
		E							31		O				B			
		E							55		O			A	B			
I									60		O				B	P	M	
		E							71		O				B		M	
	O								74					A	B		M	
14*	29	57	14	0	0	14	0	0		14	57	14	0	43	86	14	43	0

TABLE 2—*Concluded*

A RATINGS									80 EXECUTIVES	B RATINGS								
Life Insurance Selling	Office work	Enginger	Lawyer	Accountant	Banker	Personnel Manager	Minister	Artist		Life Insurance Selling	Office work	Engineer	Lawyer	Accountant	Banker	Personnel Manager	Minister	Artist
Miscellaneous group																		
		E							6					A				
I		E							13		O			A		P		
						P			14	I			L					
			L						17	I				A		P		
I									47						B	P		
									49		O							
I						P			50									
I									57		O							
									79				L	A	B	P		
44*	0	22	11	0	0	22	0	0		22	33	0	22	44	22	44	0	0
Entire group																		
34*	14	14	13	10	6	6	3	0		29	38	31	28	35	60	34	18	9

1 to 60 inclusive are rated A in executive interest, numbers 61 to 80 are rated B. The columns to the left record A ratings in the various occupations, the columns to the right record B ratings. Thus No. 1, the manufacturing executive who obtained the highest score in executive interest, was rated A in life insurance selling and B in engineering, certified public accounting and banking interest. Executive No. 3 has the same interests as No. 1 except that he rates B in selling insurance instead of A.

A summary of the characteristics of each of these sub-groups of executives is given in percentages. Thus, 25 per cent of manufacturing executives rate A in life insurance selling interest, whereas 67 per cent of merchandising executives, 60 per cent of insurance executives and 57 per cent of public utility executives rate A in this occupation. On the other hand, only 20 per cent of finance executives, 14 per cent of engineering execu-

tives and 0 per cent of bank presidents rate A in selling life insurance.

It is generally assumed that business and law are closely associated, possibly because law is so extensively studied as preparation for business. From these data it appears that executives have more definitely the interests of a life insurance salesman than of any of the other eight occupations considered here. This result may be due to imperfections in the test procedure. It may be due to the fact that the chief function of executives is to influence others and that that capacity is more clearly exemplified among life insurance salesmen than among clerical workers, engineers, lawyers, etc.

To aid in making the characteristics of each sub-group of executives stand out, the *differences* between each sub-group and the entire eighty are given in table 3. Thus, whereas 10 per cent of the eighty executives rate A in C.P.A. interest, no manufacturing executive rates A in this interest, or 10 per cent *less* than the average. On the other hand, 60 per cent of finance executives rate A in C.P.A. interest, or 50 per cent *more* than the average.

Summarizing roughly the data in table 3, we may say that manufacturing executives do not differ from the average of the eighty executives in any significant way; that merchandising executives rate higher in life insurance selling than the average; that banking executives rate lower in engineering and life insurance interest; that public utility executives rate higher in banking and office interest and lower in law interest; that engineering executives rate higher in office work and engineering interest and lower in life insurance selling interest; that finance executives rate higher in C.P.A. interest and lower in life insurance interest; and that insurance executives rate lower in C.P.A., office work and engineering interest and higher in personnel and life insurance selling interest.

Because a considerable number of men in one occupational group rate A in another occupational interest does not mean that interests in the two occupations correlate. The men who obtain the A rating in the second occupation may score high

TABLE 3

Showing differences between each sub-group of executives and the entire eighty

	C.P.A.		BANKING		OFFICE WORK		LAW		PERSONNEL		MINISTRY		ENGINEERING		LIFE INSURANCE		ARTIST	
	A	A and B	A	A and B	A	A and B	A	A and B	A	A and B	A	A and B	A	A and B	A	A and B	A	A and B
24 Manufacturing Executives...	−10	−3	−6	9	−6	−11	0	−7	−6	−2	−3	0	7	15	−9	−9	0	−1
12 Merchandising Executives...	7	−20	−6	−16	−6	−11	−5	0	−6	−15	5	4	−14	5	33	21	0	−1
11 Banking Executives.....	8	9	12	7	−5	2	5	32	−6	−4	−3	3	−14	−27	−34	1	0	18
7 Public Utility Executives...	4	26	37	6	43	48	−13	−27	−6	−11	−3	−7	−14	12	23	8	0	−9
7 Engineering Executives.....	−10	−2	−6	20	15	34	1	−27	8	−12	−3	22	43	26	−20	−35	0	−9
5 Finance Executives.....	50	35	−6	14	6	28	7	19	−6	0	−3	−1	−14	−5	−14	−43	0	−9
5 Insurance Executives.....	−10	−25	−6	14	−14	−52	7	19	14	20	17	19	−14	−25	26	37	0	11
9 Miscellaneous Executives...	−10	−1	−6	−44	−14	−19	−2	−8	16	26	−3	−21	8	−23	10	3	0	−9
Average of 80 Executives....	10	45	6	66	14	52	13	41	6	40	3	21	14	45	34	63	0	9

in the first occupation, or low in the first occupation or just average. In the case of engineers it is noticeable that nearly all who rate A in executive interest rate very high in engineering interest, whereas most of those who rate A in personnel, school teaching, advertising, public accounting, life insurance, ministry, author and artist, rate relatively low among engineers for engineering interest.

Correlations are given in table 4 between a number of occupational interests as obtained from 80 executives, 49 C.P.A.'s, 42 engineers and 48 personnel managers. The most noticeable thing about these correlations is that nearly all fall between +0.30 and −0.30. A second interesting point is that approximately the same correlation coefficient is obtained between two occupational interests regardless of what group of men are studied. It is conceivable that two occupational interests might have high correlation when executives are studied and relatively low correlation when engineers are studied. But this does not seem to be the case. Of course, the same stencils are used in scoring for engineering interest and personnel interest, respectively. This possibly explains the fact that the correlation between these two interests is practically the same whether the blanks of executives or engineers, or personnel managers are scored. Yet it is somewhat surprising when it is realized, for example, that personnel managers rate relatively high in law and their interests correlate positively with those interests, whereas engineers rate low in that profession and their interests correlate negatively with lawyer interests and still the correlation between engineering and personnel interests remain the same whether engineers or personnel men or executives are studied.

Evidently the higher a man scores in executive interest the higher he will tend to score in C.P.A. (+0.48) and engineering (+0.32) interest. But executives score on the average lower in these interests than they do in life insurance selling interest, where the correlation between executive and selling interest is lower (+0.22). The more these arrays of data are studied the more the necessity is emphasized of determining the elementary traits so complexly intermingled in each of these occupational

TABLE 4

Correlations between various occupational interests

	CORRELATIONS BASED ON DATA FROM			
	80 executives	49 C.P.A.'s	42 engineers	48 personnel managers
Executive and C. P. A.	0.48	0.31		
Executive and Engineer	0.32		0.37	
Executive and Life Insurance Salesman	0.22			
Executive and Bankers	0.19			
Executive and Lawyers	0.16			
Executive and Office Worker	0			
Executive and Personnel	−0.12			0.15
C.P.A. and Engineers	0.07	0.13	−0.21	
C.P.A and Life Insurance Salesman	−0.19			
C.P.A and Banker	0.46	0.16		
C.P.A. and Lawyer	0.19	0.19		
C.P.A. and Office Worker	0.22	0.12		
C.P.A. and Personnel	−0.20	0		0.10
Engineer and Life Insurance Salesman	−0.34			
Engineer and Banker	−0.15		−0.09	
Engineer and Lawyer	−0.47		−0.36	
Engineer and Office Worker	0.04		−0.26	
Engineer and Personnel	−0.35		−0.30	−0.36
Life Insurance Salesman and Banker	0.05			
Life Insurance Salesman and Lawyer	0.20			
Life Insurance Salesman and Office Worker	−0.07			
Life Insurance Salesman and Personnel	0.27			
Banker and Personnel	−0.43			−0.39
Lawyer and Personnel	0.47			0.47
Office Worker and Personnel	−0.39			−0.26

groupings. But such a study must wait until far more data have been accumulated.

Too much reliance must not be placed upon these correlations between occupational interests because they are based upon small groups of from 42 to 80 men; also because these groups

have been carefully selected and supposedly contain only successful men. If a real sampling of engineers, for example, were obtained, including all degrees of engineers from men of national reputation to those engineers just able to earn a living, a different situation might be discovered. It is quite conceivable that executive and engineering interest might not correlate as high as 0.37 or that it might correlate still higher, when all engineers are taken into account.

It is significant for vocational guidance purposes that these occupational interests correlate low and that, as Cowdery has found, they correlate about zero with intelligence scores. It is possible that the interest test is measuring merely specialized experiences and nothing more. This would account for the correlations given in table 4. But it is not easy to explain the zero correlations between occupational interests and intelligence. The more intelligence one possesses the more one is supposed to pick up and retain the resultants of experience and this fact should lead to positive correlations between occupational interests and intelligence.

EXTENT TO WHICH MEN IN OTHER OCCUPATIONS RATE LIKE EXECUTIVES

In the preceding section we have considered the extent to which eighty executives have rated in the interests of executives and of seven occupational groups. Let us turn now and note the extent to which these seven occupational groups rate in executive interest.

Considering A ratings alone 33 per cent of C.P.A.'s rate like executives, so also do 21 per cent of personnel managers, 18 per cent of life insurance salesmen, 17 per cent of engineers and lawyers, 2 per cent of artists and 0 per cent of ministers. (See table 1.) If A and B ratings are both considered we have: 90 per cent of C.P.A.'s, 88 per cent of personnel managers, 84 per cent of engineers, 82 per cent of life insurance salesmen, 80 per cent of lawyers, 43 per cent of ministers, and 22 per cent of artists that rate like executives. There is here such an excessive

amount of overlapping as to make questionable the value of this executive interest test. Averaging the overlapping in each of these eight occupational interest tests we have the results shown in table 5.

The overlapping in the case of the executive interest test is three to four times that obtained from the other seven occupational interest tests. And it is double that when executives are scored on these occupational tests (9 per cent overlapping, rating A alone; 39 per cent, rating A and B combined).

It is quite conceivable that this large overlapping when executives are scored for other business occupations is correct.

TABLE 5

	RATING A	RATING A AND B COMBINED
	per cent	*per cent*
Life insurance selling	9	44
Engineer	3	28
Lawyer	8	25
Certified public accountant	3	15
Personnel	1	31
Minister	2	15
Artist	0	5
Average	4	23
Executive	15	70

Seemingly executives should have some interest in the work of lawyers, engineers, accountants, office workers, life insurance salesmen, and personnel managers. And the fact that they do not rate like ministers and artists supports the conclusion that these interest tests are fairly reliable. But it is not so easy to believe that the majority of engineers, C.P.A.'s, personnel managers, lawyers, etc., have the interests of executives. To accept this view necessitates a conclusion that is not held by business men generally. It is supposed that executives are few in number and that only the exceptional man is willing to assume responsibility.

It is possible that the results obtained here are correct, that the executive interest test is approximately correct and that a large per cent of the men in these six business occupations are executives at heart. All those tested in these six occupations are successful men. They represent a very small fraction of the population. Possibly among such men there are to be found a large percentage of potential executives.

The writer is willing to believe that there is some truth in this argument. But he desires much more proof than is now at hand. The executive interest test should be applied to a considerable population made up of all the employees in several business organizations. If only a small percentage rate like executives, the above figures must be accepted, surprising as they are. If a large percentage of employees rate like executives then either the prevalent views of business men must be discounted or the test questioned. After all, what is a reliable check on such a test? This raises the question, who is an executive?

WHO IS AN EXECUTIVE?

Everyone takes it for granted that he has a clear concept of an executive. If pressed for a definition he makes an attempt, then becomes confused, and finally resorts to giving examples. If all agreed as to who are executives in a given community there would be a basis for analyzing out the common elements in the men named, or their jobs. But those whom the writer has asked have not agreed. All consider that the men who are actually at the head of very large corporations are executives; they believe also that men who are vice-presidents or superintendents of production in large plants are executives. But there is no unanimity when the heads of finance, engineering, sales or personnel departments are mentioned, nor agreement with respect to the heads of banks, brokerage houses, retail stores, etc. Apparently all are agreed one is an executive if he directs the work of a large number of men who are organized in the typical "line" or "military" form of organization. But

if there are not so many employees, or if they are organized in the typical "staff" organization or scattered around the country in small groups, then there is difference of opinion as to whether the leaders of such groups are executives or something else.

The definition of an executive that was used in this study is "one who is called an executive by a competent judge, who has at least 100 men under his direction and who serves on the executive committee of his organization." Whether a man fits the last two items of the definition is a matter that can be definitely ascertained. Other definitions that were considered were not so good in this respect. The first part of the definition is necessary because on that basis many specialists and staff officials are eliminated—men that hardly anyone would classify as executives.[4]

It seems clear that executives do not constitute an occupational group in the same sense that is true of ministers, lawyers, life insurance salesmen and the like. The head of a large bank is a banker as well as an executive, the head of a large public utility is an executive but he may be also an engineer or a financier. Seemingly executives comprise a portion of the men who are leaders in many other occupations. But all leaders are not executives. Leadership in the sense of technical knowledge does not necessarily make one an executive; nor does leadership as that term is applied to politicians, editors, ministers and the like constitute one an executive.

The hypothesis underlying the development of this executive interest test was that there are some interests common to all executives and that if executives of varying types of business were grouped, the interests peculiar to banking, engineering, manufacturing, etc., executives would more or less cancel out learning only those interests common to all these varying kinds

[4] Most of the eighty executives were nominated by Mr. H. S. Dennison, President of the Dennison Manufacturing Company; Mr. Roy N. Bishop, President of the Sperry Flour Company, and Mr. Geo. Bell, Secretary of the Caterpillar Tractor Company. It was largely due to their assistance that the blanks were filled out by these prominent executives.

of executives. These remaining interests would be those interests common to the executive function.

There is, unfortunately, no proof that this will occur. It is possible that the hypothesis is sound and that even if complete success has not been secured in this case, it may be obtained with a revised blank and when a much larger and better sampling of executives are studied. On the other hand, it is possible that the elements common to all executives, when their special interests have been canceled out, are so common to all men that a test developed in this way will not be sufficiently exclusive.

Another approach to this problem is this: Develop a series of interest scales for banking executives, railroad executives, sales executives, etc., just as scales have been developed for lawyers, bankers, and the like, and study these executive scales to determine the common elements in them. Such a program is worth while since the separate executive scales would have some value in themselves. Only by experimentation will it be possible to determine the possibility of discovering in this way the common interests of executives as such.

SOME PSYCHOLOGICAL ASPECTS OF COMMITTEE WORK[1]

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INTRODUCTION

The committee is a perquisite of democracy. There was a time when the king, the owner of an industrial establishment, or the head of an educational institution or system made most of the necessary decisions. But today a goodly part of the world's deliberations takes place in committees. It is seldom feasible for an entire democratic group to consider and decide every issue. Hence the selection of smaller and even more wieldy groups to consider details and even make final decisions for the larger group which they represent.

This trend is well represented in current systems of national government. The democracy elects its various senators, members of parliament and whatnot to represent it. However these legislative bodies themselves are too large to weigh carefully each issue that arises. So we find the Committee on Foreign Affairs, the Committee on Appropriations, the Committee on Immigration, the Committee on Finance, etc., appointed to deal with special problems. In fact in the 69th Congress there were eighty-one official standing committees not counting numerous social committees.

Wallas, in his book "The Great Society" writing concerning the policies of the English government says:

> It is clear that a conscious psychological analysis of our social institutions, if it is at all widely undertaken, must ultimately lead to changes

[1] A second article by the same author will appear in the next issue of this JOURNAL. At that time the writer will discuss the sex of committees, whether or not a committee should have a limited amount of time in which to act, and the types of persons who serve best on committees.

both in the details of our representative and official Thought Organizations and in the spirit in which these organizations are worked. The first and most obvious of these changes would follow a consideration of the purely quantitative question as to the best size of deliberative assemblies. I believe that the size of many of our most important governmental bodies of English government could be reduced so as to secure more efficient deliberations.

Again in industry there is a trend toward giving the workers more of a voice in the management. But it is obviously impossible to assemble the entire clientele to decide numerous questions of policy so the task must be delegated to properly elected committees comprising perhaps both workers and managers. And even in academic circles the problems become too involved for the entire faculty to disentangle, so long suffering altruists take up as committees the burden laid down by the hoi polloi.

Now what do we find the committees doing? Their tasks run the whole gamut from the simple such as providing warm lunches for the employees to the complex such as determining the firm's policy as to employee's representation; from the concrete such as the effect of rest pauses on output to the abstract, the points which should be stressed in advertising the firm's product; from the trivial such as arranging for a company outing to the most profound as how can the firm best serve its customers in the future. Each of these tasks requires the speedy and accurate performance of competent committeemen in order that the organization represented may prosper.

Now how do we find committees doing their work? In a great variety of ways. Some have a definite plan of procedure while others work more or less at random. In some cases the chairman is aggressive and in other cases he merely records the decisions of the group. Some committees meet around the lunch table; others in the office. Some are limited as to time because members have subsequent engagements and other committees have unlimited time. Obviously there are wide differences in procedure.

We naturally think in this connection of the problems of

group behavior versus individual behavior. Burnham,[2] Moede[3] and Allport[4] and other experimenters have showed that persons in a group act differently from isolated individuals. There are so many possibilities of stimulation by other members of the group that it is harder to predict what a given individual is going to do. The writers mentioned above found for instance in various types of experiments that there was a marked effect due to motivation and that this effect was in proportion to the size of the group.

But studies such as these shed only a dim light on the large problem of committee efficiency. The usual committee is not a mere group doing collectively what each individual member could do equally well alone if properly motivated, but is discussing and arguing back and forth with a great deal of mutual interstimulation. Some psychologists whose lot it has been to serve on numerous committees have been impressed by the fact that often there is a great deal of lost motion involved. This is particularly noticeable when one has had contact with a variety of committees. Some committees seem to go direct to their destination while others go from New York to Boston by way of Chicago or Hudson Bay. Some even go into blind alleys and sleep. Some are a tremendous success socially but not otherwise. And it is fortunate that some are effective from both the standpoint of speed and accuracy. Wallas says:

> I have myself during the last twenty-five years sat through perhaps 3000 meetings of municipal committees of different sizes and for different purposes and I am sure that at least one half of the men and women with whom I sat were entirely unaware that any conscious mental effort was called for on their part. They came much in the same manner as they went to church, with a vague sense, that is to say, that they were doing their duty and that good must come of it.

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[2] Burnham, W. H. The group as a stimulus to mental activity. Science, 1910, 31, 761.

[3] Moede, W. Experimentelle Massenpsychologie Beitrage zur Experimentalpsychologie der Gruppe. Leipzig, 1920.

[4] Allport, F. H. The influence of the Group upon association and thought. Journal of Experimental Psychology, 1920, 7, 159–182.

But why these differences? We have here a challenge for the scientist. This is an age of efficiency. We motion study our workmen in industry and reduce the operations of laying brick from 18 to 5.

It is impossible to estimate how much of the world's time and energy is wasted in ineffective committee work. We do not notice the loss because we do not apply time study, cost accounting and all the rest to the committee's job. We do not "fire" a man for being a poor committeeman and we do not "fire" the committee except in extreme cases. But the loss must be tremendous and even a modest gain in the efficiency of every committee would in its cumulative effect be very large. The congressmen could have more golf, the industrial worker or business man more time to dig in his garden and the professor more time to play bridge.

The present research proposes to make a beginning on the problem of improving the effectiveness of committee performance. Obviously we cannot solve the whole matter at once. It is necessary to anaylze it into a number of discrete problems. Some of these are rather obvious such as size, sex, general intelligence of the group, influence of authority, conventional versus unconventional, influence of time limit, and many other factors. It would be a lifetime's job to solve all the committee problems that have a psychological angle. It has been necessary in the present study to concentrate on a few of the salient ones such as the following:

1. What is the best size for a committee? Is a committee of three more efficient than a committee of six?
2. How is the sex factor related to committee efficiency? Should committees be all of one sex or should they be composed of both sexes? Is there any relation between sex and the type of work the committee can most effectively perform?
3. Should the committee have a definite amount of time in which to act or should there be no time limit?
4. Are there certain types of individuals who can work more effectively on one kind of committee problem than on another? Should a committee be preferably homogeneous as far as type of individual is concerned?

A statement of the method and a description of the materials used in attacking the above problems will now be given.

MATERIAL AND METHOD

In selecting the material for this experiment we had in mind the range of problems with which committees deal in practical life and effort was made to get procedures which would cover a similar range. Consequently several types of material were selected, ranging from the concrete to the more abstract. As suggested it was possible to try only a limited number of approaches and to choose some that were widely different and still typical of practical committee performance.

While the effect of practice with these materials subsequently proved to be rather slight, still whenever it was technically possible a practice series was used in order to get the subjects acquainted with the type of experiment to be performed. In most cases the material was divided into two series of approximately equal difficulty. This was done by preliminary experiments where the actual time for each photograph or problem was recorded. In arranging the two series care was taken to divide the photographs or problems into series so that the total time for each series would be practically the same. Thus the practice effect, if any, could be determined by comparing the performance on the second series with that on the first.

The results were generally scored in two ways: First, on the basis of the accuracy of the performance; and, second, on the time required to complete the experiment. In practical life we are concerned both with the rapidity of the committee's action and also with the quality of its report.

Four types of material were used:

1. Photographs Portraying Emotions
2. Multiple Choice Problems
3. Bridge Problems
4. Judging English Compositions

These four types of materials and the methods used in each case will now be described in detail.

PHOTOGRAPHS PORTRAYING EMOTIONS

Ever since the time of Charles Darwin investigators have been interested in facial expression as related to emotions. Such experiments can be conducted quite conveniently by the use of photographs. Though it is highly improbable that permanent mental characteristics such as intelligence, neatness, sociability, etc., may be judged with accuracy from facial contours and expressions, it would seem that such temporary conditions as emotions which involve definite movements of facial muscles may be so judged. The writer holds no brief for the so-called "sciences" of phrenology and physiognomy,—they deal with permanent rather than temporary aspects of one's appearance.

This material was selected for use in the present study because it yields a rather personal type of situation for the committee and also because it has been used with fair accuracy by other experimenters. Feleky[5] in 1914 conducted an experiment in judging emotions from photographs. The procedure was as follows: Several hundred photographs of the same individual were taken at different times during a period of one year. As the individual posed for each photograph she had definitely in mind the type of emotion she was trying to portray. Feleky selected eighty-six of these photographs and presented them to one hundred reliable persons as judges. The photographs were numbered. Each judge received a sheet of paper with a list of numbers similar to those on the pictures and also a sheet with a list of 110 emotions to aid him in selecting the proper ones for the photographs. By this method Feleky selected the 24 photographs upon which there was the most agreement. Langfeld[6] and several other experimenters have carried on similar experiments of this kind and their results tend to corroborate those of Feleky.

[5] Feleky, A. M. Emotions from photographs. Psychological Review, 21, 1914, 33–41.

[6] Langfeld, H. S. Judgment of emotions from facial expressions. Journal of Abnormal Psychology, 1918, 13, 172.

The writer used the twenty-four photographs from the Feleky experiment. They were about 3 inches by 3 inches and were mounted on grey cards 4.5 inches by 4.5 inches. The photographs were placed in random order on the table before the subjects, care being taken, however, not to have two similar photographs adjacent. The subjects were given mimeographed sheets containing the following directions and list of emotions:

Examine the following list of emotions carefully. From the photographs arranged on the table choose a photograph that portrays each emotion listed. Use each photograph only once. Take the emotions in the order listed and do not skip around. You are to work as a committee. Talk over each selection among yourselves. After you have come to a decision in each case, note the (printed) number on the back of each photograph and have the chairman record the group's choice on his blank. A majority vote is necessary to select a picture. After you have finished making your choices write a brief introspective account concerning your own feelings, difficulties, etc., during the experiment. Report any details which you consider would be helpful to the experimenter.

Horror	Religious feeling
Vanity	Despair
Interest in a child	Breathless interest
Fear	Sneer
Rage	Suspicion
Laughter	Modesty
Disgust	Determination
Pity	Mental multiplication
Faint suspicion	Righteous anger
Contempt	Physical pain
Hate	Sympathy
Agreeable surprise	Attention to an object

In some parts of the experiment all twenty-four photographs were used as one series while in other parts of the experiment they were divided into two series of twelve photographs each. This division was necessary when practice effect was to be considered or when one wanted to show the effect of time limit on the committee's performance. In arranging these two series the first column and the corresponding picture was called series A, while the second column was called series B. Care

was taken not to have two similar emotions such as suspicion and faint suspicion in the same series.

This experiment was scored on the basis of the number of photographs selected correctly according to the Feleky standard and also on the basis of the total time required for the operation.

MULTIPLE CHOICE PROBLEMS

The multiple choice method was selected because it seemed to represent a highly abstract type of problem in contrast with other types of materials used in this experiment. This method was first used by Hamilton[7] and later by Yerkes,[8] Burtt,[9] and others on mammals. Yerkes subsequently adapted the apparatus to use with the human subject. It was this latter type of apparatus that was used in the present experiment.

Yerkes' method consisted in presenting to the subject a bank of twelve wooden keys, 1 inch by 3 inches. These could be drawn back within the apparatus or any desired number could be presented for the subject to operate. They might, for instance, be presented with two keys at the extreme left, five near the center or even the whole twelve. Each group of keys presented was termed a "setting." The subject was told that the pressing of one key in the group presented would yield the desired effect, such as the ringing of a buzzer. In each series of settings the same principle regarding the successful key was involved. For instance it might be that the second key from the left end of the setting always rang the buzzer. The subject was told to attempt to press the correct key in each trial and also to state the principle involved as soon as he had discovered it.

The directions which the writer used were very similar to those of Yerkes except that they were designed for a group

[7] Hamilton, G. V. A study of trial and error reactions in mammals. Journal of Animal Behavior, 1911, I, 33.

[8] Yerkes, R. M. A study of human behavior. Science, 1914, 39, 625–633; A new method of studying ideational behavior. Journal of Comparative Psychology, 1921, I, 369–394.

[9] Burtt, H. E. A study of the behavior of the white rat by the multiple choice method. Journal of Animal Behavior, 1921, 6, No. 3, 222–46.

experiment and not for individual experimentation. Nine problems were used. A sample of these problems is given below. The principle or rule is given in brackets. The figures in the column headed "setting" indicate the keys which were pushed out for the subjects to operate. For instance the first setting on the first problem used keys 6 to 12 inclusive, and if the chairman of the group pressed 6 the buzzer sounded.

PRACTICE PROBLEM (FIRST KEY ON LEFT)		PROBLEM I (MIDDLE KEY)	
Settings	Correct key	Settings	Correct key
6–12	6	1– 7	4
11–12	11	10–12	11
3–11	3	6–10	8
1– 5	1	1–11	6
4–11	4	1– 3	2
10–12	10	4–10	7
5– 9	5	1– 9	5
2–12	2	9–11	10
8–11	8	1– 5	3
7–12	7	6–12	9

These problems were selected from the ten problems Yerkes suggested to be used in testing human subjects. The eight problems were arranged in such order that two series could be used,—problems 1, 3, 5, and 7 composing series A and problems 2, 4, 6, and 8, series B. A more simple introductory problem was used in each case in order to orientate the group before presenting the regular series. In recording the results on this type of material two scores were used,—one the total number of keys pressed before the principle involved was discovered, and the other the total time required for the solution.

BRIDGE PROBLEMS

The third kind of material selected for use in the committee experiment consisted of bridge problems. In each instance a few cards remained in each hand and the problem was for a

designated team of players to play in such a way as to take a specified number of tricks. Eleven problems were used in all,—some from Work's[10] book on Bridge Problems and the rest made up by the writer. They were arranged in two series, A and B, of five problems, with one extra problem to be used for practice. In making up the two series care was taken to get problems of about the same difficulty and those in which there was but one solution according to the best rules on bridge playing. This was done in preliminary experiments with quite a large number of players of various degrees of ability, each player solved the problems individually and in addition to having the time recorded was required to rate each problem as to its relative difficulty. Only those problems which could be solved by the player of average ability were adopted. The following is a sample of the type of material:

North

Spades
Hearts J–8
Diamonds J–9
Clubs A–10–9–5

	Spades	Q–9		Spades	
	Hearts	K–10–3		Hearts	Q–6–5–2
West	Diamonds		*East*	Diamonds	5
	Clubs	7–4–3		Clubs	K–8–6

South

Spades
Hearts A–9–4
Diamonds Q–8
Clubs Q–J–2

Problem: North and South no trump bid; South's lead; must take 6 of the 8 remaining tricks

[10] Work, M. C. Auction Bridge. John C. Winston Company, 1926, pp. 475.

The following directions were given the group of subjects:

This experiment deals with committee work and introduces a series of bridge problems. You need not be an expert player in order to take part. On the table you will find the hands of various players. A number of tricks have been played. Assume that every player knows every card remaining in the hands. You will be required to work out a system of plays by which the bidder may take a certain number of the remaining tricks (say 4 out of 5 for example). In most cases the problems have been so arranged that there is only one correct solution. There are six problems in the series (the first being for practice). Each problem requires a different type of solution. You are to work as a group, everybody aiding in the solution. When you have reached a solution one member will put it in writing. When you have finished and have your solution to each, report same to the instructor in charge before starting the next problem.

The results with this type of material consisted of the time required to solve the series. The subjects always continued until they reached the correct solution. Inasmuch as the order of plays might vary somewhat in reaching the same solution an accuracy score was not feasible. However, the experimenter was careful to require a satisfactory solution to each problem before recording the time.

GRADING ENGLISH COMPOSITIONS

The fourth type of problem given the subjects in this experiment on committee work was making judgments of quality on a series of English compositions. Thorndike[11] in 1916 gathered together one hundred and fifty selections of English composition written by students of various ages and abilities. These were divided into three groups according to the following subject matter:

1. Common Sense (a paper published by Thomas Paine).
2. Deep Haven (the description of a New England fishing town).
3. English Compositions (written on various subjects).

There were 100 compositions of the first group, 18 of the second and 32 of the third.

[11] Thorndike, E. L. English Composition; 150 specimens arranged for use in Psychological and Educational Experiments. Teachers college, 1916.

Thorndike had a large number of teachers rate these selections as to their merits on the basis of general value. He used the median of the range of ratings on each composition as the score or value. The writer picked two series A and B of five selections each from the three types of subject matter,—30 selections in all. Using the value given to the selections by Thorndike as an index of their difficulty, effort was made in each case to keep the two series equal in total difficulty and to avoid the space error. Thus in series A of any set, if the selection which was given the highest rating by the Thorndike raters was placed at the beginning of the list, in series B, the corresponding selection which should likewise receive the highest rating, was placed farther down on the list. Practice effect could also be taken care of by having two series of equal difficulty and inverting the order in different experiments.

The following directions were given the subjects working on the experiment:

> This is an experiment in committee work. Here are some samples of English composition. You are to work together as a committee and rate them as to their values as compositions. Put the selection you consider best first, the composition you consider the next to best second, etc. Read them over carefully and indicate when you have finished reading so that your chairman can call for a vote as soon as all have finished. Do not be *over* critical concerning spelling or grammar as these compositions were written by students of all ages, but rate them on the basis of their general content and expression.

The results were based on both accuracy and time. As an index of the former the ranking given by the committee was correlated with the correct ranking as assigned by Thorndike's raters, using the rank difference formula. The correlation coefficient thus gave an indication of the correctness of the committee's judgment. The time taken to complete the ranking was the other score considered.

SUBJECTS

There were 1312 subjects used in this experiment. The majority of these were enrolled in courses in Psychology at the

Ohio State University. Some of them served in more than one group but in no case was such an individual put through the same set of material twice. Most of the subjects participated only once. Over 50 per cent of the 1312 subjects were of Freshman or Sophomore rank. The ages ranged from fifteen to thirty years, the median age being twenty years. We find that 50 per cent of the group range from nineteen to twenty-one years of age. Most of the subjects used in this experiment had taken the Ohio State University Intelligence Test and their scores showed that they ranked somewhat higher in intelligence than the average group.

RESULTS: THE SIZE OF COMMITTEES

Committees vary greatly in size. Some are composed presumably of entirely too many members and thus are unwieldy, while others may consist of too few members to contribute adequately to the solution of the committee's problem. The first fundamental question undertaken in this experiment was to determine the influence of size of a committee upon its efficiency. Groups of three and groups of six subjects were selected to participate in the various types of experiment. There was no particular reason for selecting groups of exactly these sizes except that they seem to be fair examples of small and of large committees. Both male and female groups were used so that the influence of sex might also be considered. There were 252 males and 198 females used in this experiment.

The material used in the experiment consisted of the four types as mentioned earlier in this paper; viz. Photographs Portraying Emotions, Multiple Choice Problems, Bridge Problems, and Judgments of English Compositions. As the materials in each case were divided into two series,—series I and series II,—practice effect could be controlled. This was determined by selecting paired groups, comparable in size and sex,—for instance, if a group of females without practice was used a group of females with practice was also included. The average for all such groups with practice was then compared with the average time for the paired groups without practice. The per

cent superiority of the former to the latter gave a general index to the effect of practice with that particular type of material. This was done for all four types of material. Groups of six subjects were selected (for example A, B, C, D, E, and F). Subjects A, B, and C as a group tried series I, then all six tried series II, and then the other three tried series I. Several groups were put through in this order then other groups were used in the reverse order. The number of groups used was such that in the case of the smaller groups there was about the same number of groups with practice as those without practice. It should also be noted that a part of the larger groups of six members always had a chance to become orientated by having done a previous series when serving in a group of three.

The responses of the groups were scored on the basis of accuracy and also on the amount of time necessary to complete a satisfactory solution of the problem in hand.

Let us now consider the results. Using series I of the Photographs Portraying Emotions we find the average time for the small male groups is 147 seconds with 8 photographs correct while the larger male groups take 195 seconds and get 9 photographs correct. When we examine the results for the male groups on series II the small groups take 203 seconds with 7 photographs correct while the large groups take 159 seconds and get 7 photographs correct. We may assume series I and series II to be of approximately equal difficulty because preliminary experiments were tried in which this was found to be the case (see section on methods and materials). We find the average time for all 12 groups of three males each is 170 seconds with 7 photographs correct, while the 6 groups of six males each average 182 seconds with 8 photographs correct. The larger groups are slower and slightly more accurate.

On series I of the same materials the groups of three females each average 179 seconds with 8 photographs correct while the large groups of 6 females each use 215 seconds and get 6 photographs correct. On series II the small groups of females average 142 seconds with 8 correct while the larger groups average 197 seconds with 7 photographs correct. The larger groups are in

this case inferior both in speed and in accuracy. If we consider all groups of females on both series together the small groups average 157 seconds with 8 photographs correct and the larger groups average 208 seconds with 7 correct. This tends to show that the smaller groups of females work faster and are more efficient than the larger groups.

If we consider all the results for both males and females on other series I and series II the average for the 22 groups of 3 members each is 171 seconds with 8 photographs correct and for the 11 groups of 6 members each is 191 seconds with 7 photographs correct. The average intelligence rating for both the small and large groups is 50; so the difference in efficiency is not due to a difference in intelligence.

This indicates that the smaller groups are quicker and on the average as accurate, sometimes even more accurate, than the larger groups. This is true in both male and female groups. When we find the ratio of the difference between the two averages to its probable error we have 2.9 for the time and 2.7 for accuracy.

Let us now consider the results obtained by using the second type of material; namely, the Multiple Choice Problems. It was necessary to use different subjects in this experiment. The general plan of procedure was identical with that previously discussed. The problems were arbitrarily numbered from 1 to 8 and alternate problems used to make up two series.

On series I the groups of 3 males use on the average 40 keys and take 172 seconds while the groups of 6 males on the same series use 37 keys in 154 seconds. On series II the groups of 3 males use 45 keys in 200 seconds; the groups of 6, 43 keys in 162 seconds. Since series I and series II are of practically the same difficulty we may combine the results on both series. The groups of 3 males average 43 keys in 186 seconds while the groups of 6 males average 40 keys in 58 seconds. Thus with the males it seems that the larger groups are more accurate and take less time.

The female groups of 3 members each use 44 keys and require 220 seconds in solving series I while the larger groups use 30

keys in 124 seconds. On series II the smaller female groups use 55 keys with 230 seconds while the larger groups use 37 keys with 227 seconds time. Considering series I and series II together the 10 groups of 3 females each average 49 keys in 225 seconds while the groups of 6 females average 33 keys in 175 seconds. Again on this type of material the results show that the larger groups are more efficient.

When we combine the results of both the males and the females on series I the small groups use on the average 43 keys with 202 seconds, while the larger groups use 34 keys and 142 seconds. On series II the smaller groups use 51 keys and 209 seconds, the large groups 41 keys and 188 seconds. Now if we combine all groups disregarding sex and series we find that the 16 groups of 3 members each score 42 keys and 210 seconds, while the 10 groups of 6 members each used 37 keys and 165 seconds. The practice effect in the Multiple Choice Problems shows 16 per cent increase in speed with no gain in efficiency. When we find the ratio of the difference between the two averages to its probable error we have 2.7 for the keys or accuracy and 2.0 for the time or speed. This gives a probability of 97 chances out of 100 that a real difference exists for accuracy and 91 chances out of 100 for speed. The average intelligence rating for the small groups is 56 while the large groups have an average rating of 48. This difference in intelligence probably is not enough to introduce an error into the experiment. In fact the more efficient groups are slightly inferior in intelligence.

These results seem to show that the larger groups are quicker and more efficient than the smaller groups. We must not fail to consider however the type of problem given the committee in this case, in comparison with the other materials used. The solution of the Multiple Choice Problems is very different, for instance, from the selection of photographs portraying certain emotions. In the latter case each member of the group has his own opinion of how an enraged person should appear, and a small group seems more effective in pooling these individual opinions. In the Multiple Choice Problems each member of the group adds his part to the solution and tries to help the

group evade the unsuccessful key. In this case there is greater chance for interstimulation and it may be that the larger the group the more speedy and accurate are the reactions. Brief judgments may be good on photographs for deliberation seemed to lead generally to much argument without much gain in accuracy. In the Multiple Choice Problems the group is constantly checking a theory and the argument is usually to the point. It is a case of trial and error with ideas and the more ideas available for trial the better. Each member tries to help avoid the unsuccessful keys and to eliminate the theories which are not successful and to suggest new principles which may be correct.

Let us now turn to the results obtained by the use of the third type of material, namely, the Bridge Problems. Again the individuals used in this part are not the same subjects used in the other parts of this experiment. The previous plan of using groups of 3 and of 6 members was followed. Ten problems were used, being divided into two series of equal difficulty as mentioned in a previous section of this paper. The practice effect with this type of material shows that groups with practice are only 15 per cent faster than those without practice. The groups of 3 males doing series I have an average time of 840 seconds in solving the 5 problems, while the groups of 6 males average 426 seconds. On series II the smaller groups average 569 seconds, the larger groups, 528 seconds. When we consider the result of both series the 12 groups of 3 males each have an average of 683 seconds and the groups of 6 males have an average of 477 seconds. This is in favor of the larger groups. The reader will recall that this bears out our findings with the Multiple Choice Problems.

The female groups composed of three members each on series I average 817 seconds while the groups of 6 members each average 1385 seconds. The smaller groups have an average intelligence score of 45, the larger 61. This is a comparatively slight difference. One of the problems in this series seemed to be much more difficult for the females than the other problems and this may account for the average of the female groups being so high.

On series II the smaller groups of females average 792 seconds and the larger groups 510 seconds. When results from both series I and series II are combined the 8 groups of 3 females each have an average time of 804 seconds and the 4 groups of 6 females each take on the average 948 seconds. The average intelligence of the smaller group is 49 and of the larger group 48.

If we now examine the combined results of male and female groups on series I the 10 groups of 3 members each average 835 seconds, the 5 groups of 6 members each, 809 seconds. In series II the 10 groups of 3 members each average 667 seconds, the 5 groups of 6 members each have an average time of 521 seconds.

Combining the entire results from series I and series II male and female groups the 20 small groups average 746 seconds, the 10 large groups 665 seconds. When we find the ratio of the difference of the two averages to its probable error we get 1.1. The average intelligence of both the large and small groups is 53 so the factor of intelligence need not be considered. The difference in time in favor of the larger groups is probably due to type of material. However, the female groups do not show this general trend so much as the males, and in one series actually reverse it. It may be that they are more closely connected with the Bridge situation in their social activities. In observing these groups of subjects the experimenter noted marked difference in the general attitude of the players as far as sex was concerned.

The experimenter observed that in the male groups each member seemed to try to figure out a solution for himself. A different type of activity was observed in the female groups. Each member would offer her suggestions concerning the plays and then some other member would tell what difficulty would be encountered by so playing. There was much activity and exchange of views. The experimenter felt that the females were much less accurate. Accuracy scores were not taken however for the subjects, inasmuch as each group was required only to arrive at a satisfactory solution to the problem, although the order of plays might vary somewhat.

In conclusion it would seem that this difference in favor of the larger group is due to the type of situation which the Bridge Problem presents and that the difference is greater in the case of the male groups than in the female groups. These conclusions seem to corroborate the results of similar groups on the Multiple Choice Problems, although the difference is not quite so significant in this case. In both the Multiple Choice Problems and in the Bridge Problems we have an abstract type of situation. In both cases the groups are trying to find a principle which is involved. This principle does not represent anything that is personal to them, perhaps nothing even which they have experienced in quite the same way before. The other types of materials seem much more personal and concrete and individual opinion is paramount. With abstract material the factors added by each member of the group are especially helpful in arriving at a solution; hence the effectiveness of the larger group.

The fourth type of material used in the experiment on the size phase of the committee problem was Judging the Value of English Compositions. The subjects used in this section were not the same as those used in the previous experiments with the other types of material. The general procedure of using groups of 3 and 6 members each was the same as previously described. The groups of 3 males each in solving series I have an average accuracy of 0.33 with 1063 seconds time while the groups of 6 males score 0.64 with 1718 seconds time. On series II the small groups have an accuracy score of 0.6 with 688 seconds while the large groups have an accuracy score of 0.83 with a time of 1208 seconds. When the results of both series are combined the small groups average 0.47 in accuracy and 875 seconds in time while the large groups average 0.73 in accuracy with 1487 seconds time. The larger groups are much slower but considerably more accurate.

Considering the females' groups on series I, the groups of 3 members each have an accuracy of 0.65 with 826 seconds time while the groups of 6 have an accuracy of 0.4 with 1361 seconds time. On series II the small groups have an accuracy score of

0.59 with 625 seconds while the larger groups average 0.7 in accuracy with 864 seconds time. Combining the results of series I and series II the small groups have an accuracy score of 0.63 with 759 seconds, the large groups 0.60 with 1029 seconds time. The larger groups of females are much slower with practically the same accuracy as the smaller groups.

When we combine the results for both male and female groups on series I the average accuracy of the small groups is 0.4 with 958 seconds time and for the large groups 0.56 with 1599 seconds time. Combining the results for the male and female groups on series II the small groups average 0.61 with 670 seconds while the larger groups average 0.76 with 1061 seconds time.

When the results for both series I and series II male and female groups are combined the average for the 16 groups of 3 members each is 0.49 for accuracy with 831 seconds time and for the 7 groups of 6 members each is 0.68 for accuracy with 1291 seconds time. The smaller groups taking 460 seconds less time are only 0.19 less accurate. When we find the ratio of the difference between the two averages to its probable error we have 4.7 for the time and 3.5 for the accuracy. Obviously both these differences are statistically significant. When we consider the effect of practice as computed before we find that the groups with practice are 32 per cent quicker and only 23 per cent more efficient. This is not a great difference.

In general these results show rather consistently that the small groups are quicker and not significantly less accurate than the large groups. This is similar to the results with the photographs and probably due to the same factor.

CONCLUSIONS

1. The size of a committee has much to do with its efficiency. In each of the four types of materials used in this problem on size there was quite a difference between the performance of groups of 3 and groups of 6.

2. This difference is somewhat dependent on the type of material or the kind of problem given the committee. In the

four types of problems used the small groups were more efficient on the Photographs Portraying Emotions and on the Judgments of English Compositions, while with the other two types of materials,—Multiple Choice Problems and the Bridge Problems the larger groups did better. This difference seems to be due to the difference between the abstract and concrete materials. The situation was such that no one had preconceived opinions but the problem was developed upon the committee's hands. The attitude of the subjects was essentially constructive and each member contributed something additional. In the previous experiments with the Photographs Portraying Emotions and the Judgments of English Compositions, however, the members had their own opinions after the first glance and the committee's task was largely that of compromising or overriding opinions. In this case the smaller group had less of this compromising and overriding to do and hence was more expeditious with no loss in accuracy.

3. The sex of the groups is another factor to be considered as far as size is concerned. On the abstract type of material the larger groups of females are better while on the concrete material there is not so much difference. The larger female groups profit more by the mutual interstimulation than the larger male groups.

4. In the subjects used in this experiment it did not seem that the factor of intelligence played an important part in obscuring the other variables that were under investigation.

JOB-ANALYZING ATHLETICS

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The first stages of this investigation of the psychology of athletics, reported at the 1925 meeting of the American Psychological Association, are combined in this article, with additional data.

The psychophysical factors on which athletic success depends should no longer be matters of mere assumption, because they can be scientifically determined as readily as the factors in which skilful artisans excel their fellows. If coaches could expend on the winners the efforts made to make team men out of candidates whose native inadequacies come to light after long tryouts, athletics would become a true art, an art with a scientific basis.

Educators seem to be no longer in doubt about the value of games and other athletic sports, not only for health and for the consumption of surplus energy that would otherwise bother the teacher, but also for the education of both body and mind. The boy or girl who enjoys few, or no opportunities for vigorous athletic training seems to grow to adulthood unable to use, without confusing amounts of static, the various psychoneural hook-ups that are as all-important to clear thinking as to the efficient converting of thought into action. This endless sorting-out of such synopses as will meet their needs with minimum loss of their time and energy is supposed to extend advantageously throughout childhood and even beyond youth into the early years of the adult.

But athletics consumes more student time and more mental energy than any subject in the college curriculum. Whether it deserves, also, the largest campus area, the most expensive

building program, the highest salaried teachers, and the most student pocket money of all the offerings of the institution is debated with increasing frequency and with greater and greater heat.

A job analysis of athletics will be a valuable aid therefore in the selection of contestants in the several athletic sports. But its greater value will be found in the light it will throw upon its place in the education program of the high school and of the college.

Athletics has either developed or degenerated into a system of competitive sports. The competitive feature eliminates a great majority of students, from the beginning, and bars out early most of those who compete for places in the teams. For the chosen few there is strenuous, perhaps abnormally strenuous, exercise during the season for that sport, with diet and sleep regulated and all forms of dissipation and every indulgence puritanically shunned.

If the personnel selected for leadership in athletics is, as coaches and directors claim, the personnel that will make the best leadership in business, in industries, in professions, in politics, in all fields of human service, this process of selection has ample justification. But if athletic superiority consists chiefly of muscular strength, there is probably no connection between these two kinds of leadership. It must be admitted that the conductor is usually larger than the brakeman on his train, that the head waiter in almost any public dining room can be singled out on the sole basis of avoirdupois, and a great majority of the politicians who win the support of the people all the way from the local school board to the senate have found large bodies and big voices better vote-getters than big arguments. On the other hand, those men who succeed in occupations in which positions of leadership are won, neither through elections nor through appointments that depend upon votes, but through the results of individual efforts, are by no means of any one size. Even if athletic achievements were found to depend, as now supposed, upon both physical and mental superiority, it would be desirable to know whether the traits

that are developed most in the popular athletic sports are the abilities that are needed most in life's contests.

It was these two objectives, the putting of athletic sports on a more scientific basis and the assigning of athletic games to their rightful place in education, that prompted me to begin the job analysis of athletics. I have enjoyed the valuable coöperation of Professor Michael Donahue and the other teachers in the department of physical education of Louisiana State University, and the assistance of several of my graduate students, J. P. Montgomery, L. J. Fox, Mrs. Oma A. Dodson, A. T. Brown, and H. L. Killen and coaches of eight high schools. Moreover, ninety-two replies were received from one hundred and ninety of the most widely-known athletic directors and coaches in the United States, to each of whom a questionnaire was sent.

There was no hope of deriving from questionnaires data of direct scientific value, but only of assembling as expert opinions as were available about the mental and physical superiorities that should be looked for in athletic winners. Although the questions were framed for the purpose of eliciting independent, individual opinions, there was a surprising amount of agreement. Sixty-seven mentioned intelligence as one of the requisites of athletic success, of whom sixty-three made it the prime essential. Fifty-five included character, forty-three determination, forty-two quickness and accuracy, and thirty-nine physical strength. All of them expressed the belief that students who lack any of the elements necessary to athletic leadership are correspondingly unlikely to succeed as leaders in commercial, industrial, or professional pursuits. Nearly every reply asserted that no other field of education makes such insistent demands as does athletics upon the manly virtues, as suppression of anger, control of appetites, fairness, and endurance of hard knocks and of harder penalizings and defeats without abating their zeal for achievement.

Very little testing of athletes has been done. H. E. Burt and J. H. Nichols found that Ohio State University athletic students were 8 per cent lower in intelligence than their non-

athletic fellows. Those who participated in football, baseball and basket ball and in wrestling had lower intelligence than those who preferred tennis, golf, cross country hiking and track.[1]

Martin Kemp investigated the relation between athletics and school standing. He found that athletic students stay in college more continuously than non-athletic students, that the scholarship of the one group averages as high as that of the other, but that there are more athletes in the extreme lower ranges of the scale and fewer in very high levels.[2]

Observation with job analysis in mind, conferences with athletic trainers, answers to questionnaires, athletic literature and the few attempts that others have made to study athletic ability have led me to investigate intelligence, speed and accuracy of movement, perception-action time, perception-choice-action time, physical strength, endurance, height and weight as probable factors in athletic achievements.

Before beginning to make any measurements, all competitors for places on teams were assigned relative ranks in athletic ability by the coaches who have trained them in the branches of athletics in which they have succeeded or failed. Later, these coaches placed after each competitor's rank a rating. The students believed to be closest to the mode were rated 100. If one seemed to belong at the extreme limit at which interscholastic records are broken, he was rated 200. All the steps from 200 to 0 were presumed to be equal. These ratings are grades, given by teachers who obviously know much better than do the teachers of academic subjects how much each of their students can accomplish when exerting himself to the *utmost*. They served as the criteria, the best available substitutes for the more desirable but thus far unobtainable actual scores of individuals in contests.

During the spring term of 1924–25 one hundred and twelve students of Louisiana State University, who had competed for membership in baseball, football, or basket ball teams, or in

[1] American Physical Education Review, March, 1924.
[2] American Physical Education Review, April, 1925.

track or field sports, were ranked and rated by each teacher of athletics independently, and were afterwards given the Army Alpha intelligence test, form eight. In like manner all Baton Rouge high school pupils who had trained for membership in athletic teams were ranked, rated and tested. Since that time students of the university and of nine smaller high schools have been studied.

Speed of motion is being measured by the long two-plate tapping board and accuracy of movements by the three-hole plate.

The knowledge of his own net height and net weight, possessed by every candidate for membership on the teams, was the source of these two kinds of information.

Maximum pressure exerted on the Smeadley hand dynamometer was recorded as indicative of each man's strength. and decrease of pressure within ten trials was recorded as the measure of endurance. These will be supplemented hereafter by measurements of strength of the back and of the legs, and of physical endurance in the legs.

Because no chronoscope (except a vernier) is yet a part of our laboratory equipment, and because any pencil and blank test that might be devised for the measurement of quickness of reaction would demand attitudes of mind and of body quite unlike those of the field, I devised and built an apparatus for the measurement of perception-choice-action-time, the promptness with which a player can perceive a new situation in a game, decide what to do about it, and begin to do it. This instrument is supported by a tall framework made of small gaspipe joined by elbows, nipples and three-way and four-way connections. A steel-rimmed bicycle wheel rests on its ball bearings at the top of this frame. A small chain is wound around the rim of this wheel once and fastened to the rim at a middle point so that it will not slip. This chain supports a large weight on one of its ends and a small weight on the other end. They were adjusted to each other, both mathematically and experimentally, so that the heavier weight, counterpoised by the lighter one, falls exactly two thousand millimeters in

two seconds. A scale in sigma (thousandths of a second) parallels the path of the falling weight and another corresponding scale is inscribed on a disc that rotates with the wheel and is read with the aid of a stationary pointer.

One end of a very light platform is hinged to the base of the frame. The other end of it hangs by a chain to a brake that is held against the rim of the wheel by strong springs. When a man stands on this platform his weight is ample to pull the brake free from the wheel. The wheel and brake are then separated less than one-eighth of an inch. While he stands there he hears the signal, "ready," and crouches, prepared to leap. The experimenter releases a screen and thus exposes to the reagent one of a series of ten simple pictures. The reagent jumps off the platform towards the right if he would like to have the incident which is represented in the picture to happen to him, or he jumps toward the left if he would not like to have that experience.

The apparatus measures the time consumed by the perception of the picture, the choice of acts based on its meaning, and the starting of the chosen act, the perception-choice-action time, in the following manner: The instant the picture finishes the quick swing into its visible position, the screen on which it is borne hits a latch which permits the shelf to be jerked by a spring from beneath the heavier weight. Thus the weight begins its fall simultaneously with the beginning of sense-perception of the picture. Its fall is interrupted by the brake during the first eighth of an inch of the reagent's leap from the platform. The short span of time consumed in perceiving the picture, in choosing, on the basis of liking or disliking, the direction in which to jump and the freeing of the impulses for that act is the preception-choice-action time.

The accuracy of these measures depends, of course, on the precision of this measuring instrument. The simultaneity of the exposure of a picture and the releasing of the weight was determined by so placing a vernier chronoscope that the weight rested on the secondary key of it and released the pendulum within the first small fraction of a millimetre of the weight's

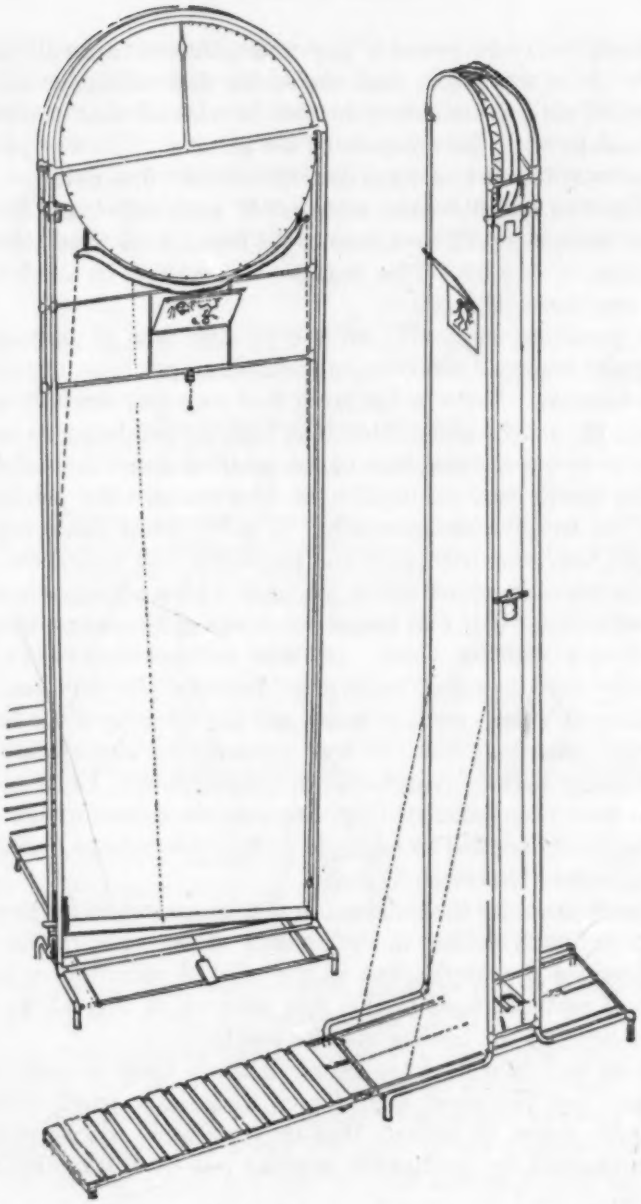

FIG. 1. REAR AND SIDE VIEWS OF THE REACTOMETER DEVISED TO MEASURE PERCEPTION-CHOICE-ACTION TIME

descent. To the primary key was attached a small piano wire which was made taut across the last millimeter of the path of the picture screen so that it released that pendulum coincident with the exposure of the picture. The two pendulums were found to always coincide in their first swing.

The two weights were adjusted to each other and to the total distance of fall by means of the formula for counterpoised weights, $S = \frac{1}{2} at^2$. This distance was verified by the following experimental method:

A pendulum supported on a knife edge was so adapted as to make exactly 1,800 complete vibrations per hour, one every two seconds. Between the latch that supports the little shelf under the weight and a latch that held the pendulum in readiness to swing a piano wire of the smallest size was stretched. When struck near its middle the wire released the pendulum and the weight simultaneously. A safety razor blade was so placed that when struck by the pendulum bob during the last millimeter of its return swing, the blade's keen edge cut through a violin string that had bound the brake of the apparatus out of contact with its wheel. In order to have the weight fall exactly two thousand millimeters between the simultaneous starting of weight and pendulum and the releasing of the brake by the pendulum itself, it was necessary to compensate for friction by slightly decreasing the counterpoise. Units of the scale were then calculated by means of the same formula and subsequently verified by means of a Hipp chronoscope borrowed from Sophie Newcomb College.

Justification for the publication of this research in its present stage is found, neither in the number of cases nor in the significance of the results, but in the need of constructive criticism of methods used in this first attempt to investigate the psychology of the leading athletic sports.

However, several of the coefficients are large enough, and all but the two most doubtful of them have small enough probable errors, to indicate that they probably will be closely approximated by coefficients growing out of further investigation.

In this table perception-choice-action correlates closest with the criterion. Intelligence comes next. There is remarkable similarity between the correlation of games with intelligence in the University and that correlation in high school A. In the other nine high schools in which separate ratings were made for their three dominant sports, the results show low correlation between football and intelligence and less between basket ball

TABLE 1

Correlation coefficients

CASES	CORRELATIVES	COEFFICIENTS	PROBABLE ERRORS
	In Louisiana State University		
46	Ratings in games, perception-choice-action	0.56	0.077
58	Ratings in games, intelligence	0.41	0.085
46	Intelligence, perception-choice-action	0.21	0.099
46	Ratings in games, perception-action	0.37	0.10
29	Ratings in track, intelligence	0.15	0.159
34	Ratings in games, endurance	−0.19	0.007
35	Ratings in games, weights	−0.19	0.108
	Ratings of Coach D, ratings of Coach W.	0.80	0.04
	In High School A		
31	Rating in games, intelligence	0.39	0.05
	In High Schools B, C, D, E, F, G, H, I, J		
134	Ratings in football, inteligence	0.27	0.057
89	Ratings in basket ball, intelligence	0.25	0.066
75	Ratings in track, intelligence	0.12	0.068

and intelligence than that between the three games, combined, and intelligence in the university or in school A.

These discrepancies may be accounted for, in part at least, by the fact that in each of the nine smaller schools players are selected and trained by that teacher of academic subjects who happens to know most about the sport of the current season, whereas in the University and in high school A high-priced

coaches do the selecting and the training of athletes. Intelligence tests were given, in all cases, by trained and experienced or, in some cases, by merely experienced administrators of tests. This may have marred the results from two or three of the smaller schools. A coefficient of 0.80 shows a fairly high correlation between the ratings assigned to the same students by the University coach of games and his assistant. The coach's ratings would correlate slightly higher with the intelligence scores than the ratings of the assistant coach. All these are indications that ratings by teachers of athletics, although more reliable than teacher's marks in academic subjects are not as good criteria as the ratio of successful to unsuccessful plays of each student in games would be if this were obtainable.

Football, as played in the smaller high schools, doubtless employs less intelligence and depends more upon size and upon speed of action than in the higher institutions. There is less difference of this kind in basket ball, as is evident in the coefficient of correlation between ratings in basket ball and intelligence quotients.

The correlation between ratings in track and intelligence is very low, and in the University and the nine high schools is nearly the same. Ratings of ability to run are assigned almost entirely on the basis of speed. Form in running, devices for out-stripping competitors, and team work, although not negligible, are so subordinated to the one desideratum, speed, that ratings can deviate very little from actual achievements. Therefore, notwithstanding the sizes of the probable errors, there is every reason for believing that intelligence plays a much smaller part in track work than in games.

The meaning of the small negative coefficient in connection with games and bodily weights, if it means anything, is that the disadvantages of weight in other motions requiring speed equal or exceed the advantages of weight. This is not probable. Ratings in games and endurance make a similar improbable showing. The small coefficient of correlation of games with endurance may be explained in this way. The athlete who can release a whole tempest of energy into a tackle, an end run,

the play of the moment, and recuperate while waiting for another opportunity is a better player in games than one whose energies tend to conserve themselves. Long distance races are won by endurance, but sprints and games are won by brief, brilliant, powerful plays.

Because these results give both perception-choice-action and intelligence high places in athletic achievement, there is reason for asking whether part of the intelligence may not have been counted twice by being measured separately and also as a factor in the process of choice, if not of perception, too. But the partial correlation of the criterion with perception-choice-action while the intelligence is constant reveals no such overlapping. The $r_{12.3}$ is .53. This coefficient is so nearly equal to the coefficient of the two factors without the control of intelligence (0.56) as to show that perception-choice-action and intelligence are almost, if not altogether, independent, interexclusive factors. Intelligence functions chiefly, no doubt, in the thorough comprehension of the game as an organic whole and of the necessity for each of its parts. Out of this clear comprehension arise the moment by moment anticipations of all that can take place and the expectation of the one or two strong probabilities. Finally, when one of these demands immediate appropriate action, the choice of the right act requires little, if any intellection as such. Swiftness of response is all-important, and the degree of the athlete's intelligence, invaluable as it is in laying the neural track, has little or nothing to do with promptness in throwing the switch when the train comes.

That the promptness with which these choices can be made determines in no small degree the success of a man in games is evident when we compare the coefficient of correlation of the criterion and perception-choice-action with that of the criterion and mere perception-reaction. The former is about one-half closer than the latter. Perception-action correlates with the criterion with as large a probable error as is at all permissible. This is no doubt due to the use of the perception-action trials

as means of warm-up and getting the mental set for the more important perception-choice-action trials.

The multiple correlation coefficient of the criterion with perception-choice-action and intelligence is 0.66. This indicates that these groups of mental factors constitute a large part of the abilities that are essential to success in athletics.

The, as yet, unmeasured factors are presumably both mental and physical. My private opinion is that imagination, anticipation, the planning function is an important part of intelligence that is very inadequately measured, if we can say that it is measured at all, in intelligence tests. Imagination has the place, we are assured by able football coaches, in their game that it has in military manouvres. During the present year I am endeavoring to find some workable plan of testing the kind of imagination that is useful in football by those who shape the offensive and defensive plans and by those who comprehend the plans in their adequate execution. Measurements are being made to discover the relations between athletic efficiency and height, weight, accuracy, speed, endurance, strength of hands, of arms, of back and of legs.

THE PREDICTIVE VALUE OF THE IOWA PHYSICS APTITUDE PLACEMENT TEST

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This study of the Iowa Physics Aptitude Test grew out of the desire of the Head of the Physics Department of Centre College for an instrument which could be used as a basis for adapting instruction to individual needs and for advising registrants of their probable success in that line of work. The discovery of some means for determining the adaptability of a student had been regarded as a problem for some time. With these ends in view, experimental use was made of the Iowa Test in the first course in physics during the session beginning in September, 1925.

Thirty-eight of the forty-one Freshmen members of this class were selected at random and given the Iowa Test during the third week of college exercises. It was found at a later time that twenty-six of these men had offered one unit of high school physics as part of their entrance credits, while twelve had received no previous training in the subject. Scores were also available for these same men upon the Otis Higher Examination of Mental Ability, B, and the Thurstone Psychological Examination, IV, both of these tests having been used for all Freshmen at the opening of the session.

Class work had not been in progress many weeks before it was noticed that there were rather great discrepancies between the performance of students in the course and their scores on the Iowa Test. A preliminary study, made upon the completion of the first semester, showed that a considerable number of the thirty-eight men had not received grades in the course commensurate with what might have been expected upon the

basis of the Test. For example, students with Iowa scores of 54, 74, and 71 of the possible 175, received semester grades of 81, 83 and 82 respectively; while others with Iowa scores of 115, 120, and 141 received grades within the middle seventies. Further, it was observed that there seemed to be more than a chance correspondence between the intelligence ratings and the Iowa scores.

Hence when the session's work was completed a more thorough study was made of the experiment. In the tables may be seen the findings. To what extent one may safely rely upon the Test to provide a basis for predicting the success of a student in physics may be judged from table 1. The coefficient of correlation between the Iowa scores and grades in physics for

TABLE 1

Coefficients of correlation between Iowa Physics Aptitude Test scores and grades received in physics and in all subjects

TEST	COURSE	r P.E.
Iowa Physics Test with	First semester physics grade...	0.50 ± 0.08
Iowa Physics Test with	Year Grade in physics.....	0.25 ± 0.10
Iowa Physics Test with	Average academic grade for year in all subjects.....	0.64 ± 0.06

the first semester is 0.50, but when the grade for the entire year's work in physics is the factor correlated, the coefficient drops to 0.25. If the Test scores and the averages of the grades received by students in all subjects combined for the year be correlated, the coefficient is 0.64. Thus the Test appears not to indicate aptitude for physics with a marked degree of exactitude, but more, fitness for general college work. It was observed that of the seven lowest scores on the Test, the three lowest and two of the remaining were made by Freshmen offering a unit of high school physics for college entrance.

The conception of the Iowa Test as an instrument for measuring a student's facility with operations and facts of the type necessary for success in general college work is strengthened by

a comparative study of it with intelligence tests. Correlations made in such a study are found in table 2. The coefficient

TABLE 2

Coefficients of correlation: Iowa Physics Test, Intelligence Tests, academic average for year and physics grade

TEST	TEST OR COURSE	r P.E.
Iowa Physics Test	with Otis Higher Examination, Form B	0.77 ± 0.04
Iowa Physics Test	with Thurstone Psychological Examination IV	0.67 ± 0.05
Iowa Physics Test	with Physics grade for year	0.25 ± 0.10
Otis Higher examination	with Physics grade for year	0.36 ± 0.09
Iowa Physics Test	with Academic average for all subjects for year	0.64 ± 0.06
Otis higher examination	with Academic average for all subjects for year	0.57 ± 0.06

TABLE 3

Distribution table comparing physics grades and academic averages for the year with scores on the Iowa Test

IOWA TEST INTERVAL	ACADEMIC GRADE INTERVALS									
	50–59		60–69		70–79		80–89		90–99	
	Physics	Academic averages	Physics	Academic averages	Physics	Academic averages	Physics	Academic averages	Physics	Academic averages
50–74		3	3	8	10	3	3	1		
75–99	1	2	2	3	5	3	1	1		
100–124	1			2	4	3	2	2		
125–149	1			1	1		1	1	3	3
150–175									1	1

between the Iowa Test and the Otis Higher Examination, Form B, was found to be 0.77, while that with the Thurstone Psychological Examination, No. IV, was 0.67. The resem-

blance of the Iowa Test in its functioning to the Otis Mental Test is striking when correlations for each are made with physics grades or with academic averages for all studies for the year. From table 2 it will be seen that in our experiment the Otis Test correlated slightly higher with the results of the year's work in physics, though both coefficients are very nearly the same in value and both so low as to be negligible for use in predicting ability in that subject. When both the Iowa and Otis scores are correlated with the academic average of each student for all his subjects for the year, again the coefficients are so nearly the same as to suggest a high degree of likeness between the tests themselves.

Table 3 affords a view of the comparative distributions of the actual grades made in physics or the academic averages on all subjects for each student with the interval in which his score on the Iowa Test fell. The point already indicated may be observed, namely, that the academic averages for all subjects tend to bear a closer relationship to scores on the Iowa Test than do the physics grades.

SUMMARY AND CONCLUSIONS

1. The Iowa Physics Aptitude Test does not sustain a fair coefficient of correlation with performance in a college physics course, in this study the coefficient being 0.25.

2. Medium high correlations exist between the Iowa Test and the Otis and Thurstone Mental Test, suggesting some similarity.

3. The Iowa Test correlates more highly with academic averages for all subjects combined than it does with the year grade in physics. This correlation is medium high and about the same that the mental tests give.

4. In the light of the above it would seem inadvisable to assign more than slight value to the test for predicting capacity for work in physics.

SUBSEQUENT HISTORY OF E——; TEN YEARS AFTER THE INITIAL REPORT

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In 1917 a first report was rendered of the mental status and achievements of a boy E——, at that time eight years old.[1] Reference to this initial report will show that E—— yielded an I.Q. of at least 187 (Stanford-Binet), and that he was then doing superior work in the sixth grade of the Horace Mann School. In 1922 an account of this child's subsequent history appeared.[2] He was then thirteen years old, a sophomore in college.

Since the value attaching to studies of gifted children depends largely upon records of subsequent development, a third report is here offered to present data collected ten years after the initial report.

ADDITIONAL DATA ON GENEALOGY

Data bearing upon ancestry presented in previous reports will not be rehearsed here. Only data added since 1922 will be noted at this time. The remote male ancestor[3,4] from whom

[1] Garrison, Burke and Hollingworth. The psychology of a prodigious child. Journal of Applied Psychology, June, 1917.

[2] Hollingworth, Garrison and Burke. Subsequent history of E——; five years after the initial report. Journal of Applied Psychology, June, 1922.

[3] Drowne, Henry R. Family record of Solomon Drowne. New York Genealogical and Biographical Record, v. 35, pp. 171–172. New York, 1904.

[4] Drowne, Henry T. Genealogy of the family of Solomon Drowne, M.D., of Providence, Rhode Island, with notices of his ancestors, 1646–1879. Providence Press Company, 1879.

name was born in Providence, Rhode Island, March 11, 1753, a descendant of early colonial settlers in America. He graduated at Rhode Island College (now Brown University) in 1773, and later took a medical degree at The University of Pennsylvania. In 1783 he was elected to the Board of Fellows of Brown University. In 1811 he was appointed Professor of Materia Medica and Botany at Brown. In 1819 he was elected a delegate from the Rhode Island Medical Society, of which he was vice-president, to the convention which formulated the National Pharmacopoeia. He took an active part in the organ- the mother of E—— derives the middle part of her maiden ization and proceedings of the Rhode Island Society for the Encouragement of Domestic Industry. In 1824, with his son, William, he published *The Farmer's Guide*, "a comprehensive work on husbandry and gardening." He participated in the Proceedings of the American Academy of Arts and Sciences, and delivered many lectures on botany. He died at the age of eighty-one years, leaving among descendants a large proportion of persons in the learned professions.

MENTAL MEASUREMENTS

In April, 1927, at the request of the present writer, E—— took the tests of the I.E.R. Intelligence Scale CAVD, Levels M, N, O, P and Q. This series of tests is described in a recent publication.[5] Briefly, it may be said here that this instrument was chosen for the purpose in hand because it is the most thorough method available for approximating in quantitative terms the intelligence of the best among college graduates.

E——'s score on this test, at levels M, N, O, P and Q, was 441 points. The score of the average adult is not yet known but the median score of college graduates in professional schools of first rate standards is 415 points, with an upper Q at 421 points. The best scores yet made by college graduates hover about 440 points.[6]

[5] Thorndike, E. L. The measurement of intelligence. Bureau of Publications, Teachers College, Columbia University, 1927.

[6] I am indebted to Dr. Ella Woodyard and to Prof. Ralph B. Spence of Teachers College for this information.

Thus E—— rates +4.3 P.E. in relation to college graduates in first rate professional schools, ranking with the best minds revealed in any group so far tested. These groups may each be expected to include some of the best intellects existing. The comparative groups are, of course, older than E——. Some of them are composed of persons over thirty years of age on the average, while all are past twenty. E—— was eighteen years nine months of age on the date when he took the test, in comparison with these groups. The number of years lived in an intellectual environment, other things being equal, probably affects results to some extent in favor of those who have lived longer.

A score of 441 points on the I.E.R. Scale corresponds to a score of about 116 points on the more widely known Thorndike Test for College Freshmen. The top one per cent of college graduates make a score of 108 or better on the latter test.[6] E——, therefore, surely rates at least in the top one-quarter of one per cent of college graduates. (E——, it will be noted, is now at the average age of college freshmen.)

At the age of eight years, E—— rated +11 P.E. in general intelligence (by Stanford-Binet) as compared with the generality of eight-year-olds. It seems likely that he now rates at about the same status, in relation to the generality of eighteen-year-olds, since his status is +4.3 P.E. *in relation to highly selected groups of college graduates.* E—— being now eighteen years nine months old is probably mature, or nearly mature, intellectually. However, in view of recent findings[7] in regard to the growth of intelligence among pupils in high schools, we cannot be sure that he has quite reached the maximum of possible accretions of power from inner growth.

PHYSICAL SIZE

E—— has probably now achieved his maximum stature. At the age of eighteen years four months (October, 1926) he

[7] Thorndike, E. L. On the improvement in intelligence scores from fourteen to eighteen. Journal of Educational Psychology, 1923.

weighed 194.75 pounds, stripped. He measured 6 feet 1 inch in stature. He is in excellent health. His only illness in five years was a "light case" of scarlet fever.

SCHOLASTIC STATUS

In June, 1923, E—— was graduated from Columbia College, with the degree of B.A. He took general honors, Phi Beta Kappa honors, and the English Seminary Prize, awarded by the Society for Promoting Religion and Learning, "for the best essay in sermon form on an assigned topic." E—— was within eleven days of his fifteenth birthday when he was graduated. He was elected to Phi Beta Kappa at the age of fourteen years ten months, probably the youngest person ever elected to that organization.

E—— was graduated with excess credit (8 points) toward the M.A. degree. This degree was awarded to him in June, 1924, when he was not quite sixteen years of age, more than enough work for it having been accomplished. He was matriculated for the Ph.D. degree before he was sixteen years old, and has practically finished (at the age of eighteen years nine months) all of the requirements for the Ph.D. degree except completing the dissertation. The dissertation subject has been approved, and E—— is at work upon the material, which lies in the field of history.

In October, 1926 (aged eighteen years four months), E—— entered upon his professional studies for the ministry, in the theological seminary of his choice. Since the age of fifteen years, E—— has done special work at the seminary. He has read prayers in one of the City churches as a lay reader, since the age of sixteen, and has been made a candidate for ordination as deacon, but this ordination cannot take place before the twenty-first birthday. In the initial report of E——, it will be found that he had decided before he was five years old to be a clergyman. It is expected that his professional course toward this end will be completed in 1929.

TABLE 1

Summary of development of E— over period from 1916 to 1927

Born June 17, 1908. (According to official birth certificate, and hospital records).

	E——	NORMS FOR PRIVATE SCHOOLS*
November 4, 1916:		
Height	54.3 inches	49.5 inches
Weight	89.3 pounds	54.2 pounds
Intellect	I.Q. 187 (Stanford-Binet)	I.Q. 100
Scholastic status	Sixth grade (elementary school)	Third grade (elementary school)
September 29, 1921:		
Height	64.2 inches	58.2 inches
Weight	166 pounds	89.5 pounds
Intellect	194 points (Army Alpha Form 5)	47 points (Army Alpha)
Scholastic status	Fourth semester college	Eighth grade (elementary school)
October 26, 1926 (physical measure); April 1, 1927 (mental measure):		NORM FOR GENERALITY
Height	73 inches	67 inches
Weight	194.75 pounds	150 pounds
Intellect	441 points (I.E.R. Tests)	Not yet known
Scholastic status	B.A. (1923); M. A. (1924); Ph. D. candidate (Finishing first year in Theological Seminary)	Has left school to go to work

* Norms for height, weight, and scholastic status are taken from B. T. Baldwin, as established at Horace Mann School, Francis Parker School, and the elementary and high schools of the University of Chicago.

RESEARCHES OF E——

When E—— was ten years old he made an original contribution in connection with the Pentateuch, and was made a member of The Oriental Society of Research in Jerusalem.

In 1923, he presented his M.A. essay, *Apollonius, Dioecetes of Egypt*, which pertains to Egyptian history of the third century B.C.[8]

E—— has also done research (1924–1925) on the order of Pliny's letters; on Irish constitutional history (1924–1925); and is at present (1927) reading Greek papyri. The subject of his dissertation to be submitted in partial fulfillment of the requirements for the Ph.D. degree, is *Feudal Estates in Byzantine Egypt*.

At thirteen years of age, E—— was first admitted to the Bodleian Library, at Oxford, for purposes of research.

SUMMARY OF DEVELOPMENT TO DATE

A summary of development of E—— over the period from 1916 to 1927 is given in table 1.

This summary clearly shows that the superior magnitudes both of mental caliber and of physical size, so markedly present at the age of eight years, are maintained as growth terminates.

[8] On file in the Library of Columbia University.

A TRIAL WITH CRITERIA OF THE MacQUARRIE TEST OF MECHANICAL ABILITY

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This paper reports limited but fairly clear-cut results from a trial of the MacQuarrie Mechanical Ability Test with a group of fifteen college students selected according to outstanding ability, either in the field of mechanical stimulation or language stimulation, as judged by one to whom they were well known. A composite ranking was made of the fifteen students according to concrete abilities and according to abstract abilities. Each individual was given the following tests:

MacQuarrie Test of Mechanical Ability
Army Alpha, Form 7
Stenquist Mechanical Ability Test, No. II
Kohs Block Design Test

Correlations between these several measures by the Spearman Rank Difference Method appear below. The last eight are partial correlations.

1. MacQuarrie vs. Stenquist	+0.66	±0.098
2. MacQuarrie vs. Army Alpha	−0.35	±0.159
3. MacQuarrie vs. Kohs	−0.45	±0.140
4. MacQuarrie vs. Estimates of Concrete Abilities	+0.33	±0.161
5. MacQuarrie vs. Estimates of Abstract Abilities	−0.30	±0.165
6. Stenquist vs. Army Alpha	+0.10	±0.181
7. Stenquist vs. Kohs	−0.12	±0.179
8. Stenquist vs. Estimates of Concrete Abilities	+0.63	±0.105
9. Stenquist vs. Estimates of Abstract Abilities	−0.06	±0.182

10. Army Alpha vs. Kohs	+0.58	±0.117
11. MacQuarrie vs. Stenquist (Eliminating Army Alpha)	+0.75	±0.074
12. MacQuarrie vs. Stenquist (Eliminating Kohs)	+0.75	±0.074
13. MacQuarrie vs. Army Alpha (Eliminating Stenquist)	−0.55	±0.123
14. MacQuarrie vs. Kohs (Eliminating Stenquist)	−0.45	±0.140
15. Stenquist vs. Army Alpha (Eliminating MacQuarrie)	+0.47	±0.139
16. Stenquist vs. Kohs (Eliminating MacQuarrie)	+0.27	±0.168
17. Army Alpha vs. Kohs (Eliminating Stenquist)	+0.60	±0.112
18. Army Alpha vs. Kohs (Eliminating MacQuarrie)	+0.50	±0.133

These results are only suggestive of the general relationship situation between the abilities measured because of the limited sample. The probable errors indicate how much reliance for general application can be placed in these correlations. From the measurement of the abilities of this group of fifteen cases the results are rather clear cut and the following conclusions may be drawn:

1. The MacQuarrie Test of Mechanical Ability and the Stenquist Mechanical Aptitude Test (No. 2) measure to a marked degree the same group of abilities, which is evidenced by the correlation between them of +0.66 and, when what is measured by Army Alpha or the Kohs Block Design is eliminated, of +0.75. There is, however, a substantial dissimilarity between these tests.

2. The group of abilities, measured by the MacQuarrie and Stenquist tests, is distinctly different to the group of abilities measured by Army Alpha and the Kohs Block Design Test. In the case of the MacQuarrie test the correlations with Army Alpha and the Kohs test are −0.35 and −0.45 respectively. In the case of the Stenquist test the correlations with Army Alpha and the Kohs test are +0.10 and −0.12 respectively.

3. The MacQuarrie Test of Mechanical Ability and the

Stenquist Mechanical Aptitude Test (No. 2) measure to a substantial degree what is estimated to be a group of concrete abilities. The correlations are +0.33 and +0.63 respectively. They do not measure what is estimated to be a group of abstract abilities. The correlations are −0.30 and −0.06 respectively.

4. Comparing the MacQuarrie Test of Mechanical Ability and the Stenquist Mechanical Aptitude Test (No. 2) there is contradictory evidence. The correlations for the two tests with the estimates of concrete abilities shows a higher validity for the Stenquist test. But in the partial correlations, eliminating what the Stenquist measures from the correlation between the MacQuarrie and the Army Alpha or Kohs, the correlation is not raised at all, while eliminating what the MacQuarrie measures from the correlation between the Stenquist and the Army Alpha or Kohs, the correlation is raised considerably. This indicates that the Stenquist measures to a greater degree than the MacQuarrie what the Army Alpha and Kohs measure and it suggests indirectly that the MacQuarrie is the better measure of mechanical abilities.

JUDGING THE INTELLIGENCE OF BOYS FROM THEIR PHOTOGRAPHS

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Ohio University

The present study is a modification of the method first employed by Pintner in his pioneer experimental study of this problem. Most recent studies of the judgment of intelligence from photographs reported by Anderson, Hollingworth, Laird and others are different from Pintner's approach in that pictures of adults were used.

This study differs from Pintner's in experimental materials and methods in the following ways: First, a narrow age range is used; the boys were between the ages of 11 and 12 years, the youngest lacked 10 days of being 11, the oldest was 14 days short of 12 years of age. Pintner used children from ages 4 to 16. Second, only boys were used in this study. Pinter used 8 girls and 4 boys. Third, two views of the face were employed instead of Pintner's one. Fourth, the photographs were all taken by Gaskill with the same camera and the views taken are as far as possible similar in all cases, being approximately 45 degree angle views from the two sides and in all cases from the head to about the waist-line. The boys are all seated. Pintner's views varied considerably; in some the children were seated; in others they stood; some consisted of just the head; others of head and shoulders; and others of almost the entire body. This last variation is responsible for a considerable difference in comparative sizes of heads; according to actual measurement of the photographs one of the heads to be judged in Pintner's group is almost three times as large as another. Fifth, in this study the difference in I.Q. from one rank to the next is never less than twice the probable error (P.E.) of the

FIG. 1

I.Q. on the Stanford Revision of the Binet Test. Gaskill merely selected the boys from a list of names and did not know the features of any of the boys. The I.Q.'s of our group are as follows: 18, 26, 36, 55, 63, 71, 99, 111, 119, 128, 140, 171. The tests were not all given by the same person as was done in Pintner's study. He himself gave the Yerkes-Bridges Point Scale to all of his subjects. In this study five of the tests were given by psychologists at the Institution for the Feebleminded at Columbus, Ohio; six were given by Gaskill (who had had a semester's course in mental measurements previously) and one (171 I.Q.) was tested by Dr. Maxfield of Ohio State University. It is, of course, no easy matter to find subjects in so restricted a group in a small community. The six finally selected by Gaskill were chosen from 30 boys tested by him with the Stanford Binet, who had been selected for this experiment from over a hundred upon the basis of an earlier GIQ obtained with the National Intelligence Test. The I.Q's of the children used by Pintner were 54, 65, 72, 76, 81, 83, 90, 97, 108, 120, 140, 143. Our range exceeds Pintner's by 64 I.Q. points. In a projected repetition of this study the gap in our group from 71 to 99 will be filled by one or two pictures. Another suggested study will utilize 40 pictures chosen in conformity with the normal distribution curve.

The pairs of pictures were arranged, of course, in a chance order and mounted on manila folders. They were distributed to individuals in nine college classes in General and Educational Psychology ranging in number of students from 16 to 48 (see table 3). The judging was done by each individual as independently as was possible under laboratory class conditions. The following mimeographed directions were given to each individual.

Study the two photographs of each of the twelve boys. These children vary in intelligence, no two being equally bright.

Study the photographs and select the boy which in your judgment looks the brightest, i.e., the most intelligent. If at first several appear to you about equally bright, set them aside and use a brief method of paired comparison to determine the brightest of the lot. Then select the second brightest, the third brightest, and so on. After you have arranged them all go through the series again to see if each boy looks brighter than the one before him and duller than the one ahead of him in the list. If not revise the list to accord with your final judgment.

The results are given in the three tables. In all cases the correlation coefficients were obtained by the formula:

$$\rho = 1 - \frac{6 \Sigma D^2}{N(N^2 - 1)}$$

$$\text{P.E.}_\rho = 0.706 \frac{1 - \rho^2}{N}$$

TABLE 1

The frequencies with which the 274 judges assigned ranks 1 to 12 in intelligence to boys A to L from their pictures

RANKINGS ASSIGNED	BOYS A TO L WHOSE INTELLIGENCE WAS JUDGED FROM PHOTOGRAPHS											
	A	B	C	D	E	F	G	H	I	J	K	L
1	11	37	12	2	35	2	92	40	13	1	27	2
2	7	30	35	12	41	3	47	30	16	1	44	8
3	20	28	28	11	40	5	29	41	17	2	39	14
4	17	28	22	22	40	2	34	35	35	3	18	18
5	19	28	20	28	35	14	15	25	33	7	25	25
6	29	24	25	31	31	18	18	26	26	8	28	10
7	26	27	24	26	16	25	12	25	29	6	28	29
8	28	25	27	45	16	24	9	15	31	16	12	26
9	33	17	25	38	12	39	7	13	14	23	26	27
10	27	20	29	33	4	44	6	11	27	34	12	27
11	34	3	15	19	2	51	4	4	24	62	10	46
12	23	7	12	7	2	47	1	9	8	111	5	42
Median rankings	7.3	5.5	6.2	7.8	4.5	9.9	2.7	4.7	6.9	11.4	5.4	8.8
Q	2.4	2.3	2.8	1.9	1.7	1.8	1.7	2.2	2.3	1.2	1.4	2.7
Approximate median class rankings	8	5	6	9	2	11	1	3	7	12	4	10
True rankings by test	3	5	2	9	4	10	6	1	8	12	7	11
I.Q.	128	111	140	55	119	36	99	171	63	18	71	26

Table 1 gives the actual assignments for each boy's pictures, the true median and Q for these, and the rank assigned in computation; in addition are given the true rank and I.Q. of each boy. In table 2 are presented the distributions of the corre-

TABLE 2

Distribution of correlation coefficients of each of the 274 student judges with test rankings

INTERVAL	FREQUENCY
−0.50 to −0.40	1
−0.39 to −0.30	0
−0.29 to −0.20	2
−0.19 to −0.10	8
−0.09 to 0	9
0 to 0.09	21
0.10 to 0.19	29
0.20 to 0.29	22
0.30 to 0.39	36
0.40 to 0.49	36
0.50 to 0.59	46
0.60 to 0.69	37
0.70 to 0.79	15
0.80 to 0.89	11
0.90 to 0.99	1
	274

Median	0.425
Q	0.149
Mode	0.50 to 0.59
Q_1	0.20
Q_3	0.59

TABLE 3

Median correlation coefficient of each class group and correlation coefficient median class rank against criterion

CLASS IN PSYCHOLOGY	NUMBER OF STUDENT JUDGES	MEDIAN INDIVIDUAL CORRELATIONS OF EACH CLASS	CORRELATION OF MEDIAN CLASS RANKINGS WITH RANKINGS BY INTELLIGENCE TEST
1	33	0.42	0.52 ±0.14
2	37	0.49	0.63 ±0.12
3	16	0.45	0.45 ±0.16
4	12	0.35	0.69 ±0.11
5	27	0.35	0.83 ±0.06
6	48	0.51	0.69 ±0.11
7	34	0.42	0.69 ±0.11
8	37	0.36	0.68 ±0.11
9	30	0.43	0.77 ±0.08

lation coefficients of the 274 individuals. Table 3 gives the median correlation coefficient of each class in Psychology and the correlation coefficients of the median class ranking against the criterion. All computations were made by Gaskill.

CONCLUSIONS

This study is a variation of Pintner's earlier study; the differences in procedure and experimental material are cited above. The judges of the intelligence from the photographs used in this study were college students in psychology classes. Our group of observers is more homogeneous and very much larger than Pintner's. The variation in findings in the two studies (Pintner's and ours) seems to be due not to any inaccuracy in Pintner's original work. Repetition of his method under experimental conditions similar to the one described above for our own class group following Foster (Experiments in Psychology, 1925) invariably gave results in accordance with those obtained by Pintner. It is probable that modifications in materials used are responsible for the disagreement between our findings and those of Pintner. He expresses his conclusions as follows: "The median r for all the 63 individuals who performed the experiment is plus 0.10. On the whole, therefore, we may say that it is impossible by means of photographs to rank children according to their intelligence" (Psy. Rev., 1918, p. 293). The median correlation in our study was +0.425. One-fourth of our group did +0.59 or better (Q_3 in table 2). Seven per cent of the rankings by our student judges gave a negative correlation.

This experiment does not answer the question whether a group of persons can judge the intelligence of children in a classroom or elsewhere by their photographs alone to any extent better than chance. For one thing, our range of I.Q.'s from 18 to 171 (with chronological age so nearly constant) is an extremely unusual group. It is doubtful if a teacher ever faced such a class. A further study of teachers' judgments of intelligence with this same experimental material will be pub-

Fig. 2

lished shortly. This report, of course, is concerned merely with judgments by college students.

Another point of interest in this study is the fact that many have noted previously and which Hollingworth has stated (Judging Human Character, 1922, p. 41) as follows: "Considering the average results it appears that by combining the verdicts of several judges the accuracy of the judgments based on photographs is increased. The individual judges intelligence with correctness only 0.19 on the average; the group judges intelligence with an average correctness of 0.52." The results in Table 3 show this statement to be true in all but one class (N only 16). The correlation coefficient of the median rankings by the total group of 274 for each picture against the correct rankings is 0.70 ($\pm$0.10); the median individual correlation as before stated is 0.425.

Our group of children can be divided into two groups of six each, one with an I.Q. range from 18 to 71, the other with an I.Q. range from 99 to 171. If this is done and the two groups are separated out it can be noted from table 1 that the feebleminded half receive (from our total group) ranks 4 (the borderline case 71 I.Q.), 7, 9, 10, 11 and 12; the other group receiving, of course, ranks 1, 2, 3, 5, 6 and 8. Moreover the correlation of the true order of the feebleminded group alone against their ranked order as a separate group of six is +0.93; whereas that for the other group alone is −0.73. In view of these findings one is led to question the validity of Laird's statement: "A few weeks ago the newspapers featured the report of a demonstration of this inability to size up 'brains' or general ability from appearance. A railroad president and a feebleminded convict sat upon a platform in front of a large crowd. The members of the audience were unable to tell which was which. Again, this does not imply that the railroad president was feebleminded; it is another illustration of human inability to estimate intelligence or general ability from an interview, from personal contact, or from personal appearance" (Psychology of Selecting Men, 1925, p. 110).

FIG. 3

It may be quite true (and if anything this study would bear out this point) that individuals (in this case boys) falling in normal or superior range of intelligence cannot be accurately differentiated from each other by their photographs. But the implications of Laird's statement regarding the feeble-minded criminal and the railroad president (of supposedly average or superior intelligence) who could not be differentiated by a crowd deserve further study. Such a study is highly desirable notwithstanding the fact that in the present study pictures of boys were used and our pictures were judged not by individuals acting as members of a crowd but as partially trained observers acting independently.

NOTES AND NEWS

The University of Hawaii announces the appointment of Dr. R. G. Bernreuter, formerly of Stanford University, to the staff of the Psychological Clinic under the terms of a grant from the Rockefeller Foundation to the University. He will take part in the program of racial research recently instituted in Hawaii, which has for its purpose the study of racial differences. Dr. F. Wood Jones, recently Professor of Anatomy in the University of Adelaide, S. Australia, is in charge of the biological part of the program and Prof. S. D. Porteus, of the psychological. The grant made by the Foundation is for a term of five years.

Northwestern University reports that Dr. Franklin Fearing, Associate Professor of Psychology at Ohio Wesleyan University, has accepted an appointment as Assistant Professor of Psychology.

Dr. L. A. Thompson, Ohio State University, has been appointed to an Assistant Professorship of Psychology at Ohio Wesleyan University. Mr. Paul E. Fields, M.A., Ohio Wesleyan University, has been appointed instructor in Psychology at Iowa State College.

Dr. B. V. Moore, Associate Professor of Psychology, Pennsylvania State College, has been granted sabbatical leave for 1927–1928 to do research with the Personnel Research Federation in New York and the National Institute of Industrial Psychology in London. Dr. J. E. DeCamp has been granted sabbatical leave during the second semester, 1927–1928, for study abroad.

Stanford University announces the following changes in its personnel: Mr. Albert Kurtz, an assistant in the Psychology Department, goes to Ohio State University this year as instructor. Dr. J. Coover has accepted an appointment at Johns Hopkins for the first semester. Dr. Catherine Cox, of Cincinnati, will be a special research assistant to Dr. Terman this year. Dr. Miles A. Tinker has been appointed Assistant Professor of Psychology at the University of Minnesota. Dr. Robert Holmes Seashore is continuing his National Research Fellowship at Stanford University another year.

Harold E. Jones, Assistant Professor of Psychology at Columbia University has been given a year's leave of absence in order to accept

a post as Director of Research of the Institute of Child Welfare, University of California.

The Psychological Laboratory at Wesleyan University, Middletown, Conn., has moved into larger quarters, now occupying a floor and a half of Judd Hall. Dr. Carney Landis has been made Acting Chairman of the Department and Mr. T. A. Langlie, formerly of the University of Minnesota, has been appointed as an instructor.

Ohio University announces the appointment to the staff of the Psychology Department Dr. Harvey C. Lehman, of the University of Kansas, as Associate Professor, and Dr. Stuart M. Stoke, of the University of Buffalo, as Assistant Professor of Psychology.

The University of Washington reports the appointment of Dr. Erwin A. Esper, of the University of Illinois, as Associate Professor of Psychology. Ralph Gundlack becomes instructor in Psychology.

Princeton University has appointed Dr. E. Glen Wever and Dr. Karl E. Zener as instructors in Psychology for the year. Professor E. B. Holt will lecture on Social Psychology the second semester as visiting professor.

The personnel of the Educational Measurements Bureau of the New York State Department of Education includes the following: Chief, Dr. W. W. Coxe; Research Associate, Dr. J. S. Orleans; Psychologist, Dr. Ethel L. Cornell; Supervisor of Special Classes, Eleanor Ross, M.A.

Prof. A. R. Gifford, Head of the Department of Philosophy and Psychology, University of Vermont, is on sabbatical leave this year. He plans to go to England and Scotland.

BOOK REVIEWS

JOHN RATHBONE OLIVER. *Fear: The Autobiography of James Edwards.* New York: The Macmillan Company, 1927. 366 pp.

Although the author of this book is a psychiatrist (A.B. Harvard, M.D. Innsbruck) he states in the preface that it is "in no sense a scientific treatment of fear and its mental mechanisms." He takes a "Typical, very common case of psychasthenia, with predominant symptoms of fear" and shows "at least one method of dealing with it." Most of the book is written in the first person, as an autobiography of a patient, with a considerable amount of material skillfully brought in as hospital notes and records, and as long conversations between the physician and the patient.

The patient is a typical high-pressure business man just entering the "change in life," who worked too hard or steadily, ate and smoked too much, took too little exercise and no recreation, and finally became afflicted with concealed anxiety and fears. The immediate occasion for the beginning of these fears was the death of his partner from apoplexy, followed by the rejection of his own application for additional life insurance, on account of high blood pressure. But, as the author states, the patient was travelling the road that leads to danger, and if it had not been blood pressure it would have been something else that would have become the main object of fear. An unsympathetic wife unwittingly helped to make bad matters worse.

The treatment of the patient was preceded by a thorough physical examination by various specialists. He then was given something of a rest cure, "on isolation," to force a break with business cares and worries. During this time hydrotherapy was used, and the patient was required to spend some time each day boring holes in boards, weaving baskets, or learning to bind books. He was also required to write a section of his life history each day, and, for his own eyes only, to write each day an account of his own feelings, reactions to the things that were done and said, etc. Infected teeth were removed. The patient rebelled at being torn away from his business and at much of the "nonsense" of the treatment, but was skillfully handled during these rebellious periods to prevent his leaving. He was given some carefully selected books to read, and his interest later aroused in another patient whose condition was much worse than his. Finally, he had reached the place "where the work of the psychiatrist must stop, and where the work of the priest or evangelical minister must begin."

The author will be accused of being a "crank on religion." Some readers may discount the psychotherapeutic value of religion, and attribute the cure to other parts of the treatment. But the author believes that those with a live religion are immune to psychasthenic fears and anxieties. However, apart from a possible over-emphasis of the therapeutic value of religion in such cases, there is nothing radical about the book. Something of the general viewpoint of the author is revealed in one of the later talks with the patient in which he says: "'Psychoanalysis—that people, laymen, talk about so much nowadays—has helped many fearful people. I have known it to dissolve inhibitions and to free the mind of obsessions. . . . . I am the last man to find fault with its methods, for I have seen some of its good results.—But so have I seen some of the good results of Christian Science. Or of the teaching of the kindly M. Coué. . . . .'"

"'However, in your case I advised against a long typical psychoanalysis. For in your case either one of two things would have happened. . . . . Either you would have become impatient, after, let us say, the sixteenth two-hour session, and have gone home in a huff—half analysed, with the rough ends of your mind sticking out in disorder all over you; or else, you'd have become so dependent on your analyser . . . . that you would have been forced to go on being psychoanalysed all the rest of your life.'"

Although the book deals with fear, the author says: "Whether a real psychosis, a true depressive mental illness, may be developed from fear-reactions alone, may be questioned." In general, the author's attitude is broad, liberal, and conservatively progressive.

The book is very interesting and readable. There are some expressions that may nettle some of the more hypercritical readers and some of the most extreme behaviorists, but on the whole it contains so much of "human interest" and commonsense that few who start to read it will fail to finish it. It is a good book to put in the hands of students of mental hygiene, psychiatry, etc. It should also be of value to many of those unfortunate individuals who suffer either from vague anxieties or the more definite phobias.

C. H. Griffitts,
University of Michigan.

V. H. Pelz. *Selling at retail.* New York: McGraw-Hill Book Co., Inc. pp. 327.

This book was originally written as a correspondence-study course for the salesman who is compelled to study alone.

Mr. Pelz gives the specific purposes of the book (1) to point out clearly the elements of successful retail salesmanship; (2) to illustrate the kind of merchandise information which is necessary for the sales-

man to have and then instruct him as to how he may obtain that information for his particular goods; (3) to state and illustrate by careful analysis, the fundamental principles, chiefly of psychology, which are involved in successful salesmanship.

He seeks to dispel any illusions that a salesman may have that he must possess hypnotic ability or occult powers to persuade customers to make a purchase.

Chapters four to eight suggest and illustrate means of studying the merchandise the clerk is to sell. The customers will have more confidence in the salespeople, if they are told how goods are made, where they come from, and what points of superiority they have.

A chapter on the natural endowments a salesman should possess and how he can improve them by study and training, is of interest. The classes into which customers fall and the method of approaching each type is helpful.

The psychological trend of the book begins to be heightened at Chapter XI, "How to Make Sales-talk Effective." The four methods discussed are: (1) by arousing the customer's imagination in order to build up interest in the article; (2) by using specific words and phrases in talking up the merchandise that is actually before the customer; (3) by making appeals to as many of the senses as possible, chiefly through some form of demonstration; (4) by inducing the customer to take some action with respect to the commodity. Specific examples of conversations between customers and salespeople are given.

In the chapter, "Why People Buy" the salesperson is taught how to appeal to the instincts of self-assertion (the basis of pride and vanity), imitation, individuality, acquisition (bargain hunting) and construction. The parental instinct, and those of sociability, curiosity, and play are discussed. Under interest appeals are listed economy, cleanliness, healthfulness, convenience, durability, becomingness, style and appearance.

In making a sale obstacles must be overcome and objections met. Price is one of the greatest obstacles. The customer may say, "I can't afford it;" "The article is not worth what you ask for it;" "I can get it for less elsewhere;" or "It is more than I expected to pay." Other objections concern the quality of the goods, the becomingness of the garment or its suitableness for a particular purpose or occasion. The salesman should never argue with a customer. Antagonized customers buy only when they must. The salesman should meet the objections to the goods frankly without evading or minimizing them. He should not misrepresent the goods. The salesman should not bring up objections for the sake of meeting them. Suspicious or distrustful customers can sometimes be won over, however, if minor defects, outweighed by advantages, are pointed out.

Substitution is an obstacle in the sale. It arises when the salesman finds he does not have in stock the article or kind of goods the customer wanted. If a substitution is made at all, it must be done upon the basis of a frank comparison of prices and qualities.

The skillful salesman is one who anticipates and meets objections before the customer presents them; he agrees with the customer tactfully and gracefully; and answers his questions promptly and truthfully; he displays the goods effectively, bringing out the strong points first.

Pelz says, "When the customer's mind has fully grasped the salesman's offer, when the negative ideas, the obstructing objections, have all been dispelled, and when her mind is occupied with the good points of the article, then is the time to think of effecting the close. This is the 'psychological moment' of the sale." The close of a sale takes place in the customer's mind, so the salesman must be guided by outward indications that the customer may give of a decision. The customer may make a remark, or reveal her intentions by her actions or facial expression.

The salesman's belief that the customer will be satisfied with the article reassures her of the wisdom of her purchase, helps clinch the sale and builds good-will for the store through satisfied customers. The customer should be sent away with a favorable impression of the store and the salesman who waited upon her.

RICHARD R. FRANKEN,
New York University.

LEAL A. HEADLEY. *How To Study in College.* Henry Holt and Company, New York. 417 pp.

This book summarizes most of the practical common sense findings on how to study and includes a good many experimental results as well. It is clearly and straightforwardly written—in the imperative mode, largely—and will be of undoubted value to the conscientious student who is trying to discover weaknesses in his study habits. The section on How To Use The Library is particularly good and the inclusion of such materials as a list of common abbreviations is very helpful.

There is much repetition in the book and its length could have been easily reduced, and with profit. There are some cases of inaccuracy; as, for example, the citation of Ebbinghaus' findings that "Within an hour after learning a series 'more than half of the work done must be done over again' before it is possible to repeat the series" as being generally true for all sorts of materials (page 151). It is unfortunate, too, that in the discussions of reading and of note-making the necessity for variations of method with differences in purpose is not emphasized. Authority is not given for such statements as: "The use of ink . . . . makes for precision of thought as well as of writing," and "Black ink

looks better and is least distracting for eye and mind" (page 339), and there are a good many of such statements in the book.

In spite of these criticisms, the reviewer ranks this as one of the best books of this sort which he has seen. In his mind a course in How To Study is of very doubtful effectiveness, but the systematic use of such a book as Headley's in connection with the subject matter of regular content courses may be of great worth.

CHARLES E. BENSON, JAMES E. LOUGH, CHARLES E. SKINNER, AND PAUL V. WEST. *Psychology for Teachers.* Ginn and Company, 1926, x + 390 pp.

Perhaps the most remarkable thing about this book, all of whose authors are at New York University, is its indication of the possibility that four men can come to an approximate agreement as to the suitable content for a first course in Educational Psychology. The topics treated follow the rather conventional scheme of general psychology; i.e., a treatment of the nervous system, sensation and learning, perception and learning, imagination and learning, etc.; together with the usual subjects of transfer of training, individual differences and so on. The especial attention to the autonomic nervous system, mental hygiene and statistical methods reflects the increasing belief in the importance of these topics.

The general method of treatment is one which the reviewer has for some time wished to see—brief, relatively non-technical discussions, with very few tables, graphs and direct quotations. The assumption is, apparently, that the beginning student is not yet a scientist and that, for the moment, straight-forward statements of fact may be better than technical discussions which may hopelessly confuse before a lasting interest is aroused. This aim seems to be on the whole well carried out though one might wish for more specific applications of the facts described and possibly for more suggestions of problems yet to be solved.

The brevity of discussion has sometimes been at the expense of complete clarity and it might have been better to have omitted entirely some topics. It is doubtful, e.g., if in a text as elementary as is this one, it is desirable to include the statistics of mean deviation, standard deviation and correlation. Unfortunately, there are in the book several instances of inaccuracies and of loose writing. On plate 5 (page 27) the auditory area of the cerebrum is indicated as being the olfactory and gustatory area. On page 7, we are told: "If introspections are carried out carefully and systematically by trained observers, the results are fairly trustworthy. The teacher may, for example, note that her pupils are having some difficulties. . . . . If she will attempt to recall some of her own difficulties. . . . . Furthermore, if she will ask each student to make a careful study of his difficulties. . . . ."

"The introspective method is thus a useful adjunct. . . . ." This is then an example of trained observers! On page 67 we are told that it is unknown which of two theories of modification of connections is true and then on page 69 and following one of these theories is dogmatically asserted. On page 143, the rate of forgetting of nonsense syllables as found by Ebbinghaus is presented followed by the statement: "While this rate of forgetting holds true for the majority of adults, it varies. . . . . Having this rate of forgetting in mind, we see how important it is to review . . . .," implying the general validity of Ebbinghaus' finding to all kinds of material. This generalization, it must be admitted, is not confined to the text under discussion, but it is surely time that educational psychologists stop making it and that they familiarize themselves with some of the experimental work on memory since 1885.

The book has not only a list of questions at the close of each chapter but also long lists at the end of the book. These questions are very helpful although are not always coördinated with the textual matter. An interesting example of this is the direction to state the contribution to educational psychology made by each of 44 persons only 14 of whom were considered important enough to be mentioned in the text itself.

However, the volume is, the reviewer believes, of the type particularly suited to students beginning the subject and who have had no previous training in psychology. For such use, and with its shortcomings in mind, it is distinctly worth trying out.

D. A. Worcester,
University of Nebraska.

NEW BOOKS AND PAMPHLETS RECEIVED*

Books and pamphlets for review should be sent to James P. Porter, Department of Psychology, Ohio University, Athens, Ohio.

Applications of Clinical Psychology in Hawaii. MARJORIE E. BABCOCK. University of Hawaii Research Publications, June 1927. Mercantile Press, Honolulu. 82 pp.

A Comparative Study of Part Time and Full Time Students—Toledo, Lima, Fremont. J. RAY STINE. Ohio State Board for Vocational Education, Columbus, Ohio. 84 pp.

Clinical and Abnormal Psychology. J. E. WALLACE WALLIN. Houghton Mifflin Company. 649 pp.

Characteristic Differences in Bright and Dull Pupils. HARRY J. BAKER. Public School Publishing Company, Bloomington, Ill. 118 pp.

Dreams. PERCY G. STILES. Harvard University Press, Cambridge, Mass. Price $1.50. 80 pp.

Experimental-Deskriptive Psychologie der Bewegungen Konfigurationen und Farben Unter verwendung des Flimmerphaenomens. DR. KURT HAACK. Verlag Von S. Karger, Karlstrasse 15, Berlin, Germany.

A Gateway to the Social Sciences. BEN ALBERT ARNESON, GILBERT HOBBS BARNES, CHARLES W. COULTER, HENRY CLYDE HUBBART. Ginn & Company, 384 pp.

Health Behavior. THOMAS D. WOOD AND MARION OLIVE LERRIGO. Public School Publishing Company, Bloomington, Ill. 150 pp.

1927 Yearbook of the Southwestern Educational Research and Guidance Association. Research Service Company, Los Angeles, Calif. 59 pp.

Principles of Abnormal Psychology. EDMUND S. CONKLIN. Henry Holt & Company. 457 pp.

Probation and Delinquency. EDWIN J. COOLEY. Catholic Charities of the Archdiocese of New York, 477 Madison Avenue, New York City. $3.00 544 pp.

The Psychology of Personality. P. F. VALENTINE. D. Appleton & Company. $2.50. 393 pp.

The Psychology of Play Activities. HARVEY C. LEHMAN AND PAUL A. WITTY. A. S. Barnes & Company, New York City. $2.00. 242 pp.

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* Mention here does not preclude further comment.

The Social Composition of Boards of Education. GEORGE S. COUNTS. University of Chicago, Educational Monograph. 100 pp.

Sketches In and Out of School. GOODWIN B. WATSON AND RALPH B. SPENCE. Columbia University, New York City. 286 pp.

What Shall the Public Schools Do for the Feeble-Minded? GUY PRATT DAVIS. Harvard University Press, Cambridge, Mass. $3.50. 225 pp.

Directory of American Psychological Periodicals

American Journal of Psychology—Ithaca, N. Y.; Morrill Hall.
Subscription $6.50. 600 pages annually. Edited by M. F. Washburn, K. M. Dallenbach, M. Bentley, E. G. Boring. Quarterly. General and experimental psychology. Founded 1887.

The Pedagogical Seminary and Journal of Genetic Psychology—Worcester, Mass.: Clark University. Subscription $7. 700 pages annually. Edited by Carl Murchison and an international co-operating board. Quarterly. Child behavior, differential and genetic psychology. Founded 1891.

Psychological Review—Princeton, N. J.: Psychological Review Company.
Subscription $4.25. 480 pages annually.
Bi-monthly. General. Founded 1894. Edited by John B. Watson.

Psychological Bulletin—Princeton, N. J.: Psychological Review Company.
Subscription $5. 720 pages annually. Psychological literature.
Monthly. Founded 1904. Edited by Samuel W. Fernberger.

Psychological Monographs—Princeton, N. J.: Psychological Review Company.
Subscription $5.50 per vol. 500 pp. Founded 1895. Ed. by Shepherd I. Franz.
Published without fixed dates, each issue one or more researches.

Psychological Index—Princeton, N. J.: Psychological Review Company.
Subscription $1.50. 200 pp. Founded 1895. Edited by Walter S. Hunter.
An annual bibliography of psychological literature.

Journal of Philosophy—New York; 515 W. 116th St.
Subscription $4. 728 pages per volume. Founded 1904.
Bi-weekly. Edited by F. J. E. Woodbridge and Wendell T. Bush.

Archives of Psychology—Sub-Station 84, N. Y.: Archives of Psychology.
Subscription $5. 500 pp. ann. Founded 1906. Ed. by R. S. Woodworth.
Published without fixed dates, each number a single experimental study.

Journal of Abnormal Psychology and Social Psychology—Albany, N. Y.
Subscription $5. Boyd Printing and Publishing Co. Edited by Morton Prince in co-operation with Floyd H. Allport.
Quarterly. 432 pages annually. Founded 1906. Abnormal and Social.

Psychological Clinic—Philadelphia: Psychological Clinic Press.
Subscription $2.50. 288 pages. Ed. by Lightner Witmer. Founded 1907.
Without fixed dates (9 numbers). Orthogenics, psychology, hygiene.

Training School Bulletin—Vineland, N. J.: The Training School.
Subscription $1. 160 pp. ann. Ed. by E. R. Johnstone. Founded 1904.
Monthly (10 numbers). Psychology and training of defectives.

Comparative Psychology Monographs—Baltimore: Williams & Wilkins Co.
Subscription $5. 500 pages per volume. Edited by W. S. Hunter.
Published without fixed dates, each number a single research.

Psychoanalytic Review—Washington, D. C.: 3617 10th St., N. W.
Subscription $6. 500 pages annually. Psychoanalysis.
Quarterly. Founded 1913. Ed. by W. A. White and S. E. Jelliffe.

Journal of Experimental Psychology—Princeton, N. J.
Psychological Review Company. 480 pages annually. Experimental.
Subscription $4.25. Founded 1916. Bi-monthly. Ed. by Madison Bentley.

Journal of Applied Psychology—Baltimore: Williams & Wilkins Co.
Subscription $5. 400 pages annually. Founded 1917.
Quarterly. Edited by James P. Porter and William F. Book.

Journal of Comparative Psychology—Baltimore: Williams & Wilkins Co.
Subscription $5. 500 pages annually. Founded 1921.
Bi-monthly. Edited by Knight Dunlap and Robert M. Yerkes.

Journal of Personnel Research—Baltimore: Williams & Wilkins Co.
Subscription $5.00. 500 pages approximately. Edited by Walter V. Bingham, Lewis L. Thurstone, and Clarence S. Yoakem. Monthly.

Genetic Psychology Monographs—Worcester, Mass.: Clark University.
Subscription $7. 600 pages annually. Edited by Carl Murchison and an international cooperating board.
Bi-monthly from January, 1926. Each number one complete research.
Child behavior, differential and genetic psychology. Founded 1925.

Psychological Abstracts—Princeton, N. J.
Subscription $6.00. 600 pages ann. Edited by W. S. Hunter. Monthly.
Abstracts of psychological literature. Founded 1927.